LLFS

Visit 2

CAROTID ULTRASOUND EXAM

CODEBOOK

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12/31/2017 Data Freeze

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SECTION I: CAROTID ASSESSMENT, DATASETS AND PRIMARY VARIABLES FOR ANALYSES

1. IMT AND PLAQUE ASSESSMENT OVERVIEW

Using a portable high resolution ultrasound machine, centrally trained research assistants (RA) at each site obtained video clips and still images of the left and right carotid arteries that were then data streamed to the LLFS Carotid Reading Center (University of Pittsburgh Ultrasound Research Lab; URL). The video clips and digitized images were read by experienced trained sonographers at the reading center using semi-automated software to obtain the primary LLFS carotid measures: common carotid artery intima-media thickness (CCA IMT), inter-adventitial diameter (AD) and plaque presence and extent. Carotid intima-media thickness represents the thickness of the innermost two layers of the carotid artery walls and inter-adventitial diameter represents the diameter of the common carotid artery. This diameter measurement includes the lumen and the intimal and medial layers of the CCA. CCA IMT and AD measures were obtained from the still images.

The presence and extent of plaque in each carotid artery segment were recorded at the time of the exam by site RAs on the URL Carotid IMT Worksheet (Appendix I.1) Additionally, using the same protocol, the URL assessed plaque presence and severity in all visualized segments of the left and right carotid artery and recorded results on the Carotid Duplex Scan Feedback Form (Appendix II.2). The frozen plaque dataset to be used for analyses and described below is based on plaque assessment by the URL due to these being non-sonographers at the sites and to ensure standardization of plaque assessments across all sites. A detailed description of the carotid methods is included in Section V.1.

2. CAROTID ULTRASOUND EXAM DATASETS:

LLFS participants from 4 participating field centers (Boston, Denmark, Columbia, Pittsburgh) who had a carotid exam at Visit 2 are included in the following frozen datasets.

Dataset	Description	Primary carotid measures for analyses
carotid.sas7bdat	This dataset contains data from the URL Carotid IMT Worksheet entered into Redcap by the sites such as carotid completed status, angle of interrogation and technical and machine difficulty notes. Carotid plaque variables from this dataset are **NOT** to be used for analyses. Please use the plaque data from the **finalcqi** dataset.	None
finalcqi.sas7bdat	This dataset contains data from the Carotid Duplex Scan Feedback Form that is completed by reading center sonographers after assessing images and video clips for plaque presence and burden as well as image quality scoring. **This dataset contains the carotid plaque data to be used for plaque assessment.** There are (n=95) variables and (n=2669) observations in this frozen dataset.	plaque presence plaque index

carotidfunc.sas7bdat	This dataset contains the carotid data provided by the URL based on reading of the scan images. It contains the primary measures of CCA IMT and CCA IAD of carotid IMT data collected from the reading of the carotid scans. There are (n=92) variables and (n=2665) observations in this frozen dataset.	CCA IMT AD

The forms referenced above with corresponding dataset variable names are in Appendix I.

3. LLFS PARTICIPANTS INCLUDED IN THE FROZEN DATASETS:

There were 2837 participants who had an in person visits for LLFS Visit 2, and of these 2687 (95%) had a carotid exam performed (Table 1); 150 did not complete the carotid exam due to the reasons noted below in Table 2.

There were observations where the USB drive was corrupted at the sites (n=8) so the data could not be sent to the reading center, resulting in 2679 participant scans received at the reading center. Four observations could not be read due to having only clips provided (n=2) or files corrupted after data streaming (n=2), resulting in 2675 observations read. Ten observations out of the 2675 participants completing the carotid artery assessments (see Table 4) were dropped after data cleaning, resulting in 2665 participants in the carotid IMT frozen dataset (*carotidfunc*) with any available data.

Of the 2675 observations in the CQI dataset (*finalcqi*) six observations were dropped (See Table 5), resulting in 2669 observations in the *finalcqi* dataset. Of these 2669 (100%) had available plaque presence (*pvisual*) data and 2598 (97%) had available plaque index (*PI*) data. Sixty six observations have missing PI data for whom a minimum plaque index was imputed. These imputed data are included in the *PI_min* variable and are described in Section IV.2.2.

Table 1: Breakdown of study participants with carotid data by site

	Sites				All Sites
	BU	DK	NY	PT	
Completed Carotid visit	721	763	556	647	2687
Available *tcaf* data	689	740	538	635	2602
Available *mavg_cca* data	677	721	519	624	2541
Available *adavg* data	694	742	537	634	2607
Included in frozen IMT dataset (carotidfunc.sas7bdat)	**711**	**758**	**553**	**643**	**2665**
Available Plaque Presence data *(pvisual)*	711	762	551	645	2669
Available Plaque Index data *(PI)*	689	743	535	631	2598
Included in frozen CQI dataset (finalcqi.sas7bdat)	**711**	**762**	**551**	**645**	**2669**

*The variables references above are detailed in Section II.

Table 2: Breakdown of reasons for not having the carotid exam

Site	Equipment problems	Participant unable to do exam	Participant refused exam	Not enough time	Other	Total
BU	1	4	4	3	3	15
CU	1	6	16	37	2	62
DEN	6	6	30	17	5	64
PGH	0	2	4	1	2	9
Total	8	18	54	58	12	150

These are not mutually exclusive as there may have been more than one reason noted for not completing the carotid visit and some did not provide reasons why the exam was not performed.

SECTION II. CREATED VARIABLES

1. MAIN IMT AND AD VARIABLES FOR ANALYSES:

The following IMT and AD variables were created from data yielded from the reading of the carotid images using semi-automated edge detection software. Equations for created variables are listed in Section II.3 below. The scan protocol included obtaining a total of four images on both the right and left sides of the common carotid artery. The first two images on each side are of the distal far wall of the CCA. The *tcaf* variable is calculated as the average of these first two images on each side. The next two images captured on each side are of the distal CCA but include both the near wall and the fall wall of the CCA. The *mavg_cca* variable is calculated as the average of these last two images on each side. Lumen diameter (*ald)* and inter-adventitial diameter *(ADAVG)* measures are obtained from the last two images on each side. **The units for all these variables are millimeters (mm).**

Variables	Label	Most used in Analysis	Dataset
tcaf	New CCA Far Wall Average Mean IMT	X	carotidfunc.sas7bdat
tcafr	New CCA Right Far Wall Average Mean IMT		carotidfunc.sas7bdat
tcafl	New CCA Left Far Wall Average Mean IMT		carotidfunc.sas7bdat
mavg_cca	Original Mean IMT of Average in CCA	X	carotidfunc.sas7bdat
mavgr_cca	Original Mean IMT of Average in CCA – Right		carotidfunc.sas7bdat
mavgl_cca	Original Mean IMT of Average in CCA – Left		carotidfunc.sas7bdat
mmax_cca	Original Max IMT of Average in CCA	X	carotidfunc.sas7bdat

mmaxr_cca	Original Max IMT of Average in CCA – Right		carotidfunc.sas7bdat
mmaxl_cca	Original Max IMT of Average in CCA - Left		carotidfunc.sas7bdat
ADAVG	Original Mean Average CCA Adventitial Diameter	X	carotidfunc.sas7bdat
ADAVGr	Original Mean Average CCA Adventitial Diameter – Right		carotidfunc.sas7bdat
ADAVRl	Original Mean Average CCA Adventitial Diameter – Left		carotidfunc.sas7bdat
ALD	Original Mean Average CCA Lumen Diameter	X	carotidfunc.sas7bdat
ALDR	Original Mean Average CCA Lumen Diameter – Right		carotidfunc.sas7bdat
ALDL	Original Mean Average CCA Lumen Diameter - Left		carotidfunc.sas7bdat

2. MAIN PLAQUE VARIABLES FOR ANALYSES:

The following plaque variables were created from variables derived from page 2 of the Carotid Duplex Scan Feedback Form. Equations for these created plaque variables are listed in Section II.3 below.

Variables	Label	Most used in Analysis	Dataset
PIR	Right plaque index		finalcqi.sas7bdat
PIL	Left plaque index		finalcqi.sas7bdat
PI	Aggregate of left and right plaque index	X	finalcqi.sas7bdat
pvisual	Absence or presence of plaque	X	finalcqi.sas7bdat

Plaque was defined as a distinct area protruding into the vessel lumen that was at least 50% thicker than the adjacent IMT and summarized as the presence or absence of any plaque.

Plaque Index:

The plaque index is the summation of the plaque grades across all carotid segments visualized for both left and right carotid arteries and serves as a measure of plaque severity. Plaque grade is an estimate of the extent of focal plaque in the carotid artery segments visualized. Each carotid segment (proximal and distal common carotid artery, carotid bulb, and proximal internal and external carotid arteries) is assessed and scored individually using the criteria that follows:

Estimated extent of focal plaque	**Plaque Grade**
Absence of plaque	0
Up to 20% (usually one small plaque)	1
30 – 49% (1 medium plaque or several small plaques)	2
50 – 100% (1 large plaque or several plaques with at least 1 medium plaque	3

Data on variables listed below were collected by Reading Center sonographers via the Carotid Duplex Scan Feedback Form (see Appendix I.2). They were used to assess the presence and grade of plaque (refer to definition of plaque grade above) and were used to create the main freeze analyses variables (see "Created Carotid Variables" Section II.3).

Right side:

```
gra1rq="Right - Plaque Grade: 1-Prox CCA"
gra2rq="Right - Plaque Grade: 2-Distal CCA"
gra3rq="Right - Plaque Grade: 3-Bulb"
graerq="Right - Plaque Grade: ECA"
grairq="Right - Plaque Grade: ICA"
```

Left side:

```
gra1lq="Left - Plaque Grade: 1-Prox CCA"
gra2lq="Left - Plaque Grade: 2-Distal CCA"
gra3lq="Left - Plaque Grade: 3-Bulb"
graelq="Left - Plaque Grade: ECA"
grailq="Left - Plaque Grade: ICA"
```

3. CREATED VARIABLES AND EQUATIONS:

There were variables derived from the reading software that were not included in the frozen dataset (Appendix II). They were used to create the main analysis variables in the frozen dataset listed under "Created Carotid Variables" section and dropped from the frozen dataset.

Equations and labels for created Carotid IMT and AD Variables in the Frozen dataset (carotidfunc):

```
tcaf="New CCA  Far Wall Average Mean IMT";
      tcafr=mean(tcafr1,tcafr2);
      tcafl=mean(tcafl1,tcafl2);
      tcaf=mean (tcafr, tcafl);
mavg_cca='Original Mean IMT of Average in CCA'
      mavg_cca=(tcafravg+tcanravg+tcaflavg+tcanlavg)/4;
mavgr_cca='Original Mean IMT of Average in CCA -- Right'
      mavgr_cca= (tcafravg+tcanravg)/2;
mavgl_cca='Original Mean IMT of Average in CCA -- Left'
      mavgl_cca= (tcaflavg+tcanlavg)/2;

mmax_cca='Original Max IMT of Average in CCA'
      mmax_cca= (tcxfravg+tcxnravg+tcxflavg+tcxnlavg)/4;
maxr_cca='Original Max IMT of Average in CCA -- Right'
      mmaxr_cca= (tcxfravg+tcxnravg)/2;
```

```
mmaxl_cca='Original Max IMT of Average in CCA -- Left'
      mmaxl_cca= (tcxflavg+tcxnlavg)/2;

mmin_cca='Original Minimum IMT of Average in CCA'
      mmin_cca= (tcmfravg+tcmnravg+tcmflavg+tcmnlavg)/4;
minr_cca='Original Minimum IMT of Average in CCA -- Right'
      mminr_cca= (tcmfravg+tcmnravg)/2;
mminl_cca='Original Minimum IMT of Average in CCA -- Left'
      mminl_cca= (tcmflavg+tcmnlavg)/2;

ADAVG='Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER'
      ADAVG=(ADAVGr,ADAVGl)/2;
ADMIN='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER  '
      ADMIN= mean(ADMINr,ADMINl);
ADMAX='Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER  generated by newest AMS'
      ADMAX= mean(ADMAXr,ADMAXl);

ALD='Original MEAN AVERAGE CCA LUMEN DIAMETER'
      ALD=mean (ALDR,ALDL);
ALDR='Original MEAN AVERAGE CCA LUMEN DIAMETER RIGHT'
      ALDR=mean(l41ar3,l42ar4);
ALDL='Original MEAN AVERAGE CCA LUMEN DIAMETER LEFT'
      ALDL=mean(l41al3,l42al4);
```

Equations and labels for created plaque variables in the frozen dataset (finalcqi):

```
pvisual='Any plaque visualized'
      if pvisualrq<0 then pvisualrq=.;
      if pvisuallq<0 then pvisuallq=.;
      if pvisualrq=. and pvisuallq=. then pvisual=.;
            else if pvisualrq=1 or pvisuallq=1 then pvisual=1;
      else pvisual=0;

PIR="Right plaque index"
      PIR=sum(gra1rq, gra2rq, gra3rq, grairq, graerq);
PIL="Left plaque index"
      PIL=sum(gra1lq, gra2lq, gra3lq, grailq, graelq);
PI="Aggregate of left and right plaque index"
      PI=PIR+PIL;
```

SECTION III. DATA CLEANING AND CHECKING

1. DATA CLEANING STRATEGY

The strategy for cleaning URL carotid ultrasound data occurred in three stages. In stage one (before images were read), carotid images were reviewed and scored for overall quality assessment by the URL using the Carotid Duplex Scan Feedback Form. Images were scored per the image quality criteria noted in Section IV.2.

Flag variables based on image quality were created and are described in Section III.3.

In stage two (after images were read), carotid ultrasound data was reviewed quarterly during data conversion and before distribution to the DMCC. During this stage, potential outliers for the variables

average CCA IMT (mavg_cca) and average adventitial diameter (adavg) were flagged and queried by the URL. Potential outliers were identified as observations with values outside the range throughout data collection and anomalies were queried. The query involved reviewing the URL Carotid IMT Worksheets (Appendix I.1) and log sheets completed by site sonographers as well as the carotid images obtained at scan time. These quarterly data checks were compiled and finalized once the data collection was completed for all of the sites.

The third stage of data cleaning involved the review of the carotid ultrasound dataset as a whole at the end of the visit. For this review, the strategy was to flag observations with values falling outside the soft range listed in Table 3 for the following variables: mavg_cca, adavg and pi. In addition, values outside the range mean ±2SD for continuous measures were also flagged. The observations flagged were then cross-checked with the previously compiled list of quarterly data checks. Any observations not previously queried were checked at this time.

Table 3: Soft range for data cleaning and checking

Variable	Soft range*
Mavg_cca	0.55-1.25
Adavg	5.5-9.5
PI	0-8**

*Values outside of the soft range were flagged for data checking/cleaning
**The Pi flag criteria was different for participants aged ≤80 and >80 and is noted in Section III.2.2.

2. SUMMARY OF DATA CHECKING:

2.1 CAROTID IMT DATA CHECKS

A detailed table of observations that were checked, reason why they were flagged and final recommendations made by the Reading Center are located in Appendix III.

A brief summary of the carotid IMT data checks performed and the findings are as follows:

- **Ten observations were dropped:** Observations were dropped because participants refused the scan after it was started (n=1) or due to technical machine malfunction (n=3) or because the images were considered unreadable or of very poor quality for IMT and AD measurement per the Reading Center protocol (n=6).

Table 4: Carotid IMT observations dropped

ID	Site
25151168	BU
28276095	BU
17122375	DEN
14884134	DEN
16501919	DEN
16790941	DEN
17122375	DEN
34160416	PGH
35347871	PGH
37688801	PGH

- **Seventy two observations were modified in raw data:** For some observations that were flagged, re-reading of the images were recommended and resulted in data of higher quality. For these, re-read data replaced the original read data as indicated in the data check table (BU=22, DEN=27, CU=16, PGH=11).

- **Observations flagged for analyses:** For flagged observations (n=44), please follow the recommendations indicated by flag codes (see Created Flag Variable section below). For the code "use available data with caution" or its equivalent, it is recommended that analysts acknowledge within the analyses that these data may be less accurate. An assessment of the quality of these observations could be done in several ways, and options include running sensitivity analyses (with and without these flagged data), dropping the observations, or acknowledging in methods these specific measurement errors. The final decision is up to the investigator/analyst. The flag variables in the frozen dataset were only created for primary variables collected at all sites , i.e. tcaf, mavg_cca.

2.2 CAROTID PLAQUE DATA CHECKS

A brief summary of the plaque data checks performed and the findings are as follows:

Observations were flagged if the PI > 8 for participants aged ≤80, PI>14 for participants aged >80, or if any arterial segment contained a Grade 3 plaque.

- **One hundred forty one carotid plaque outliers** were flagged and identified for review by the Reading Center. A detailed table of observations that were checked, reason why they were flagged and final recommendations made by the Reading Center are located in Appendix IV.

- **Six observations were dropped:** Observations were dropped because of one side plaque data missing (n=3) or because the scans were poor and the plaque could not be assessed per the Reading Center protocol (n=3).

Table 5: Carotid plaque observations dropped

ID	Site
17122375	DEN
28059856	BU
33399445	PGH
42224477	CU
48247779	CU
48953087	CU

- **Sixty six observations had a minimum plaque index imputed.** If segment specific plaque data was missing we dropped the plaque index of the respective side (PIR or PIL) and overall plaque index (PI) and created imputed variables for the respective side with missing data (PIR_min or PIL_min) and for the overall minimum plaque index (PI_min). These variables estimate that the plaque index for these observations is at least the minimum plaque index (PI_min). These observations with imputed plaque index data can be used in analyses in which PI data are in categories (e.g. PI≥3).

3. CREATED FLAG VARIABLES:

The following flag variables were created based on review of the data.

Name	Meaning	Code
FLAG_CCA	If code=0 use data as is. If code=1 then these observations should be used with caution in analyses of tcaf and mavg_cca because the data may not be valid; specified in data check table. If code=2 modifications are recommended to be made to these observations; specified in data check table. **Note: 249 records coded 0; 38 records coded 1 and 6 records coded 2.**	0=Use data as is 1=Use with caution 2=Modifications recommended
FLAG_PLAQ	If code=0 use data as is. If code=1 then these observations should be used with caution or modifications recommended; specified in data check table.	0=Use data as is 1=Use with caution or modifications recommended

	Note: 22 records coded 0; 66 record coded 1.	

SECTION IV. DATA COLLECTION AND QUALITY CONTROL

1. CAROTID DATA COLLECTION PROTOCOL

Common carotid artery (CCA) intima-media thickness (IMT; primary measure), CCA inter-adventitial diameter (IAD), and plaque presence and severity, well established markers of vascular aging (Lorenz 2006, Baldassarre 2012) linked to risk of future CVD events (Lorenz MW 2007, Eigenbrodt ML et al. 2006, Polak JF 2013, Plichart M 2011), were measured via B-mode ultrasound in probands and offspring generation participants to better characterize progression in vascular aging. RAs were centrally trained to perform a carotid exam using the portable GE LOGIQ 3 BT12 Ultrasound System (GE Healthcare, Wauwatosa, WI). Following training, site staff were certified to perform research quality exams by performing >10 unsupervised certification tests against a URL certified trainer performing the same tests for comparison. Four bilateral digitized images of the distal CCA, 1 cm proximal to the carotid bulb, acquired in end diastole, was sent to the URL for centralized reading. Using semi-automated edge detection reading software (Artery Measurement System; Goteborg University, Sweden), IMT measurements were made by electronically tracing the lumen-intima interface and the media-adventitia interface across 1 cm of the far and near walls. The IAD was measured as the distance from the adventitial-medial interface on the near wall to the medial-adventitial interface on the far wall of the CCA segment. Both mean and maximum values of these measurements were used. Plaque presence was assessed in the CCA, carotid bulb and internal and external carotid arteries and defined as a distinct focal area protruding into the vessel lumen that is ≥0.50 mm or 50% greater thickness than the surrounding IMT, or had an IMT>1.5 mm (Stein 2008, Touboul 2012). Plaques were graded from 0 to 3 based on the number and size of plaques and summed bilaterally to create a plaque index (Thompson T 2008, Thurston R 2014). The scanning and reading protocols have been used in numerous studies (Sutton-Tyrrell 2002, Sekikawa A 2008, Njoroge JN 2011, Thurston R 2014). The URL has extensive experience as a training, reading and QC lab for single and multi-centered studies in the U.S. and abroad (Thurston R 2014, Rhew EY 2009, Kuipers AL 2013, Sekikawa S 2008) and has read carotid scans of more than 18 NIH-funded studies. Quality control: To ensure robust and unbiased results of carotid measures, continuous quality control in measurements (Thompson 2001) was used including ongoing quality review of all images, annual re-certification of staff, monthly repeat site scanning and URL reading to monitor intra- and inter-scanning and reading variability.

2. IMAGE QUALITY CONTROL

Every image generated throughout data collection was assessed for quality and measurability of the CCA segment. Image quality was assessed by URL sonographers using the Carotid Duplex Scan Feedback Form (Appendix I.2) so these image quality variables *(iq1r, iq2r, iq3r, iq4r, iq5l, iq6l, iq7l, iq8l)* are listed in the finalcqi dataset. Images were assessed on the scale below for each image collected per segment (8 CCA images total: 2 distal far wall CCA images on right and left and 2 near and fall wall CCA images on right and left).

Overall Image Quality Codes	
4	Excellent = All interfaces clearly identified, no artifacts seen
3	Good=Slight breaks in vessel interfaces and minimal artifact seen
2	Poor=Unclear IMT and multiple breaks in vessel interfaces and multiple artifacts seen
1	Unacceptable & unreadable images

3. SCAN/READ QUALITY CONTROL

3.1 INTRA-TECH SCAN QUALITY CONTROL

Each quarter, the site sonographers collected five one-side repeat scans among the participants to ensure intrasonographer reliability over time. Intraclass correlation coefficients (ICC) for field center RAs ranged from 0.82-0.98). The sonographers alternated the participant side scanned on a quarterly basis. The detailed quality control data are shown in the table below.

Tech ID	Site	Type	N	Mean Absolute Difference	Range of Difference	Correlation	Intraclass Correlation (ICC)
127	BU	Overscan	38	0.044	0.013-0.219	0.97	0.97
128	BU	Overscan	27	0.037	0.002-0.125	0.85	0.89
129	BU	Overscan	28	0.046	0.001-0.161	0.89	0.93
130	BU	Overscan	11	0.069	0.012-0.245	0.88	0.86
133	BU	Overscan	20	0.028	0.003-0.102	0.95	0.98
134	BU	Overscan	18	0.028	0.003-0.167	0.85	0.93
135	BU	Overscan	10	0.039	0.004-0.093	0.85	0.96
320	CU	Overscan	15	0.098	0.004-0.278	0.67	0.82
323	CU	Overscan	23	0.060	0.001-0.364	0.92	0.84
325	CU	Overscan	16	0.045	0.002-0.134	0.90	0.96
327	CU	Overscan	6	0.43	0.012-0.081	0.90	0.92
462	PT	Overscan	9	0.038	0.004-0.102	0.95	0.95
495	PT	Overscan	5	0.057	0.004-0.157	0.05	**
GBC	DEN	Overscan	45	0.057	0.004-0.177	0.88	0.86
KMR	DEN	Overscan	31	0.046	0.003-0.204	0.85	0.91
LN	DEN	Overscan	49	0.039	0.001-0.141	0.95	0.95

*Site RAs are required to perform 5 QC one-sided repeat scans per quarter
**Only based on 5 observations.

3.2 INTER-TECH AND INTRA-TECH READ QUALITY CONTROL

The primary readers at the URL also conducted a reading reliability test over the study period. Reproducibility of the IMT measure of *mavg* was excellent with an ICC of within readers 0.99-0.997, and between readers of 0.99. Detailed quality control data are shown in the table below.

Tech ID	Site	Type	N	Mean Absolute Difference	Range of Difference	Correlation	Intraclass Correlation (ICC)
108	PT	Intra-Tech	40	0.05	0.001-0.314	0.99	0.997
125	PT	Intra-Tech	40	0.08	0.004-0.609	0.97	0.99
049 vs 125	PT	Inter-Tech	40	0.08	0.000-0.477	0.97	0.99
049 vs 108	PT	Inter-Tech	40	0.08	0.004-0.413	0.96	0.99
125 vs 108	PT	Inter-Tech	40	0.09	0.006-0.586	0.98	0.99

Reproducibility of the IMT measure of *adavg* was excellent with an ICC of within readers 0.96-0.98, and between readers of 0.95. Detailed quality control data are shown in the table below.

Tech ID	Site	Type	N	Mean Absolute Difference	Range of Difference	Correlation	Intraclass Correlation (ICC)
108	PT	Intra-Tech	40	0.02	0.001-0.061	0.98	0.98
125	PT	Intra-Tech	40	0.02	0.002-0.179	0.96	0.96
049 vs 125	PT	Inter-Tech	40	0.03	0.002-0.159	0.96	0.95
049 vs 108	PT	Inter-Tech	40	0.03	0.000-0.158	0.93	0.95
125 vs 108	PT	Inter-Tech	40	0.02	0.001-0.135	0.96	0.95

4. PLAQUE QUALITY CONTROL

The URL conducted an intra-tech plaque assessment of 40 participants assessed previously on the Carotid Duplex Scan Feedback Form (Appendix I.2) and this assessment yielded a Kappa of 1.0 for plaque visualized yes/no (*pvisual)* and a weighted Kappa of 0.94 for plaque index (*PI).*

SECTION V. LLFS CAROTID ULTRASOUND EXAM PROTOCOL FOR MANUSCRIPTS

At each site, centrally trained and certified research assistants obtained bilateral carotid B-mode images and video clips using a GE LOGIQ 3 BT12 Ultrasound System (GE Healthcare, Wauwatosa, WI) equipped with a high-resolution linear array variable frequency transducer (12L5 6-10 MHz) with a superimposed simultaneous ECG recording for image standardization. Four digitized images for later reading were obtained of each of the left and right distal common carotid artery (CCA). From these 8 images, using the semi-automated edge detection software (Wendelhag et al., 1991), 4 distal far wall CCA intima-media thickness (IMT) measures and 4 near and far wall CCA IMT measures were obtained by electronically tracing the lumen-intima interface and the media-adventitia interface across a 1-cm segment proximal to the carotid bulb. The mean and maximum values for these measures were recorded for all 8 images, with the average of the mean and maximum readings of all 8 images used in analyses. Common carotid artery inter-adventitial diameters were measured directly as the distance from the adventitial-medial interface on the near wall to the medial-adventitial interface on the far wall at end-diastole across the same CCA segments used for IMT measurement. Images were read centrally at the LLFS Ultrasound Reading Center (University of Pittsburgh Ultrasound Research Lab;URL). Sonographers at the URL evaluated the presence and extent of plaque in each of 5 segments of the left and right carotid artery (distal and proximal common carotid artery, carotid bulb, and proximal internal and external carotid arteries) (Thompson et al., 2008). Consistent with the Mannheim and ASE consensus statements (Touboul PJ 2012; Stein JH 2008), plaque was defined as a focal area protruding into the vessel lumen that was at least 50% thicker than the adjacent IMT and summarized as the presence or absence of any plaque. Additionally, for each of the bilateral carotid segments, the degree of plaque was graded between 0 (no observable plaque) to 3 (plaque covering 50% or more of the vessel diameter). The grades from all segments of the combined left and right carotid artery were summed to create the plaque index (possible range:0-30) (Sutton-Tyrrell 2002). Research assistants at each of the 4 study sites were trained by the URL and monitored during the study period for reliability. Reproducibility of IMT measures was good to excellent with an intraclass correlation coefficient within sonographers of $\geq$0.8, and between readers of > 0.96. Repeat plaque assessments of 40 study participants by our lab yielded a kappa of 1.0 for plaque visualized yes/no and a weighted Kappa of 0.94 for plaque index. The plaque index was found to be a valid and reproducible measure of carotid atherosclerosis in a number of our study populations, with intraclass correlations ranging from 0.86 to 0.93 (Sutton-Tyrrell 2001). The scanning and reading protocols have been used in numerous studies (Sutton-Tyrrell 2002, Sekikawa A 2008, Njoroge JN 2011).

SECTION VI. LISTING OF VARIABLES INCLUDED IN THE FROZEN DATASET

1. VARIABLES INCLUDED IN CAROTIDFUNC DATASET

Variable	Type	Len	Label
id	Num	8	URLID
dos	Num	8	Date of Scan
reader	Char	3	Reader
INITS	Char	9	paticipants name code
Staffno	Char	8	Tech ID

dor	Num	8	Date of Read
tcaf	Num	8	New CCA Far Wall Average Mean IMT
tcxf	Num	8	New CCA Far Wall Maxmun Mean IMT
mavg_cca	Num	8	Original Mean IMT of Average in CCA
mmax_cca	Num	8	Original Max IMT of Average in CCA
ADAVG	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER
ALD	Num	8	Original MEAN AVERAGE CCA LUMEN DIAMETER
tcanr3	Num	8	Original CCA Right Near Wall Average Mean IMT -- image3
l41ar3	Num	8	Original CCA MEAN AVERAGE LUMEN DIAMETER RIGHT--image3
tcanr4	Num	8	Original CCA Right Near Wall Average Mean IMT -- image4
l42ar4	Num	8	Original CCA MEAN AVERAGE LUMEN DIAMETER RIGHT--image4
tcanl3	Num	8	Original CCA Left Near Wall Average Mean IMT-- image7
l41al3	Num	8	Original CCA MEAN AVERAGE LUMEN DIAMETER LEFT--image7
tcanl4	Num	8	Original CCA Left Near Wall Average Mean IMT-- image8
l42al4	Num	8	Original CCA MEAN AVERAGE LUMEN DIAMETER LEFT--image8
tcafr1_automan	Num	8	Auto vs manual reads image 1, MANUAL= 1,AUTO = 2, MIXED= 3
tcafr2_automan	Num	8	Auto vs manual reads image 2,MANUAL= 1,AUTO = 2, MIXED= 3
tcarad3_automan	Num	8	Auto vs manual reads image 3,MANUAL= 1,AUTO = 2, MIXED= 3
tcarad4_automan	Num	8	Auto vs manual reads image 4,MANUAL= 1,AUTO = 2, MIXED= 3
tcafl1_automan	Num	8	Auto vs manual reads image 5,MANUAL= 1,AUTO = 2, MIXED= 3
tcafl2_automan	Num	8	Auto vs manual reads image 6,MANUAL= 1,AUTO = 2, MIXED= 3
tcalad3_automan	Num	8	Auto vs manual reads image 7,MANUAL= 1,AUTO = 2, MIXED= 3
tcalad4_automan	Num	8	Auto vs manual reads image 8,MANUAL= 1,AUTO = 2, MIXED= 3
tcafr1	Num	8	New CCA Right Far Wall Average Mean IMT -- image1
tcafr2	Num	8	New CCA Right Far Wall Average Mean IMT -- image2
tcafr3	Num	8	Original CCA Right Far Wall Average Mean IMT -- image3
tcafr4	Num	8	Original CCA Right Far Wall Average Mean IMT -- image4
tcafl1	Num	8	New CCA Left Far Wall Average Mean IMT -- image5
tcafl2	Num	8	New CCA Left Far Wall Average Mean IMT -- image6
tcafl3	Num	8	Original CCA Left Far Wall Average Mean IMT -- image7
tcafl4	Num	8	Original CCA Left Far Wall Average Mean IMT -- image8
ADAVGr3	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER RIGHT-- image3

ADAVGr4	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER RIGHT--image4
ADAVGl3	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER LEFT--image7
ADAVGl4	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER LEFT--image8
tcafr1_comment	Char	60	Comment image 1
tcafr2_comment	Char	60	Comment image 2
tcafr3_comment	Char	60	Comment image 3
tcafr4_comment	Char	60	Comment image 4
tcafl1_comment	Char	60	Comment image 5
tcafl2_comment	Char	60	Comment image 6
tcafl3_comment	Char	60	Comment image 7
tcafl4_comment	Char	60	Comment image 8
tcafr	Num	8	New CCA Right Far Wall Average Mean IMT
tcafl	Num	8	New CCA Left Far Wall Average Mean IMT
tcafravg	Num	8	Original CCA Right Far Wall Average Mean IMT
tcaflavg	Num	8	Original CCA Left Far Wall Average Mean IMT
tcanravg	Num	8	Original CCA Right Near Wall Average Mean IMT
tcanlavg	Num	8	Original CCA Left Near Wall Average Mean IMT
tcmfr	Num	8	New CCA Right Far Wall Minimum Mean IMT
tcmfl	Num	8	New CCA Left Far Wall Minimum Mean IMT
tcmf	Num	8	New CCA Far Wall Minmum mean IMT
tcxfr	Num	8	New CCA Right Far Wall Maximum Mean IMT
tcxfl	Num	8	New CCA Left Far Wall Maximum Mean IMT
tcmfravg	Num	8	Original CCA Right Far Wall Minimum Mean IMT
tcmflavg	Num	8	Original CCA Left Far Wall Minimum Mean IMT
tcxfravg	Num	8	Original CCA Right Far Wall Maximum Mean IMT
tcxflavg	Num	8	Original CCA Left Far Wall Maximum Mean IMT
tcmnravg	Num	8	Original CCA Right Near Wall Minimum Mean IMT
tcmnlavg	Num	8	Original CCA Left Near Wall Minimum Mean IMT
tcxnravg	Num	8	Original CCA Right Near Wall Maximum Mean IMT
tcxnlavg	Num	8	Original CCA Left Near Wall Maximum Mean IMT
mavgr_cca	Num	8	Original Mean IMT of Average in CCA -- Right

mavgl_cca	Num	8	Original Mean IMT of Average in CCA -- Left
mmaxr_cca	Num	8	Original Max IMT of Average in CCA -- Right
mmaxl_cca	Num	8	Original Max IMT of Average in CCA -- Left
mminr_cca	Num	8	Original Minimum IMT of Average in CCA -- Right
mminl_cca	Num	8	Original Minimum IMT of Average in CCA -- Left
mmin_cca	Num	8	Original Minimum IMT of Average in CCA
ALDR	Num	8	Original MEAN AVERAGE CCA LUMEN DIAMETER RIGHT
ALDL	Num	8	Original MEAN AVERAGE CCA LUMEN DIAMETER LEFT
MLDR	Num	8	Original CCA MEAN MIN LUMEN DIAMETER RIGHT
MLDL	Num	8	Original CCA MEAN MIN LUMEN DIAMETER LEFT
MLD	Num	8	Original CCA MEAN MIN LUMEN DIAMETER
MXLDR	Num	8	Original CCA MEAN MAX LUMEN DIAMETER RIGHT
MXLDL	Num	8	Original CCA MEAN MAX LUMEN DIAMETER LEFT
MXLD	Num	8	Original CCA MEAN MAX LUMEN DIAMETER
ADAVGr	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER RIGHT
ADAVGl	Num	8	Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER LEFT
ADMINr	Num	8	Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER RIGHT
ADMINl	Num	8	Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER LEFT
ADMAXr	Num	8	Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER RIGHT
ADMAXl	Num	8	Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER LEFT
ADMIN	Num	8	Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER
ADMAX	Num	8	Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER generated by newest AMS
fc	Char	2	Field Center
flag_cca	Num	8	Flag comments on CCA

2. VARIABLES INCLUDED IN FINALCQI DATASET

Variable	Type	Len	Label
id	Num	8	URL ID
fc	Char	2	Field Center
date	Num	8	Scan Date
initq	Char	5	Participant Name Code
staffno	Char	3	Tech ID
cqi	Num	8	CQI Tech ID

Variable	Type	Len	Label
docqi	Num	8	CQI Date
scan	Num	8	Test Seq
read	Num	8	CQI Seq
iq1r	Num	8	Right: CCA #1 Overall image quality
iq2r	Num	8	Right: CCA #2 Overall image quality
iq3r	Num	8	Right: CCA #3 Overall image quality
iq4r	Num	8	Right: CCA #4 Overall image quality
iq5l	Num	8	Left: CCA #5 Overall image quality
iq6l	Num	8	Left: CCA #6 Overall image quality
iq7l	Num	8	Left: CCA #7 Overall image quality
iq8l	Num	8	Left: CCA #8 Overall image quality
comm1r	Char	50	RT CCA-#1 Comment
comm2r	Char	50	RT CCA-#2 Comment
comm3r	Char	50	RT CCA-#3 Comment
comm4r	Char	50	RT CCA-#4 Comment
comm5l	Char	25	LT CCA-#5 Comment
comm6l	Char	26	LT CCA-#6 Comment
comm7l	Char	40	LT CCA-#7 Comment
comm8l	Char	26	LT CCA-#8 Comment
ssapr	Num	8	Right - Sonographer/scanner agreement on plaque assessmeent?
pamcr	Num	8	Right - Can plaque assessment be made with clips provide
vis1rq	Num	8	Right Segment adequately visualized: 1-Prox CCA
vis2rq	Num	8	Right Segment adequately visualized: 2-Distal CCA
vis3rq	Num	8	Right Segment adequately visualized: 3-Bulb
vis4rq	Num	8	Right Segment adequately visualized: ICA
vis6rq	Num	8	Right Segment adequately visualized: ECA
pvisualrq	Num	8	Right - Any plaques visualized?
les1rq	Num	8	Right - No. of Lesions: 1-Prox CCA
les2rq	Num	8	Right - No. of Lesions: 2-Distal CCA
les3rq	Num	8	Right - No. of Lesions: 3-Bulb

Variable	Type	Len	Label
lesirq	Num	8	Right - No. of Lesions: ICA
leserq	Num	8	Right - No. of Lesions: ECA
gra1rq	Num	8	Right - Plaque Grade: 1-Prox CCA
gra2rq	Num	8	Right - Plaque Grade: 2-Distal CCA
gra3rq	Num	8	Right - Plaque Grade: 3-Bulb
grairq	Num	8	Right - Plaque Grade: ICA
graerq	Num	8	Right - Plaque Grade: ECA
cap1rq	Num	8	Right - Calcified Plaque: 1-Prox CCA
cap2rq	Num	8	Right - Calcified Plaque: 2-Distal CCA
cap3rq	Num	8	Right - Calcified Plaque: 3-Bulb
capirq	Num	8	Right - Calcified Plaque: ICA
caperq	Num	8	Right - Calcified Plaque: ECA
ssapl	Num	8	Left - Sonographer/scanner agreement on plaque assessment?
pamcL	Num	8	Left - Can plaque assessment be made with clips provide
vis1lq	Num	8	Left Segment adequately visualized: 1-Prox CCA
vis2lq	Num	8	Left Segment adequately visualized: 2-Distal CCA
vis3lq	Num	8	Left Segment adequately visualized: 3-Bulb
vis4lq	Num	8	Left Segment adequately visualized: ICA
vis6lq	Num	8	Left Segment adequately visualized: ECA
pvisuallq	Num	8	Left - Any plaques visualized?
les1lq	Num	8	Left - No. of Lesions: 1-Prox CCA
les2lq	Num	8	Left - No. of Lesions: 2-Distal CCA
les3lq	Num	8	Left - No. of Lesions: 3-Bulb
lesilq	Num	8	Left - No. of Lesions: ICA
leselq	Num	8	Left - No. of Lesions: ECA
gra1lq	Num	8	Left - Plaque Grade: 1-Prox CCA
gra2lq	Num	8	Left - Plaque Grade: 2-Distal CCA
gra3lq	Num	8	Left - Plaque Grade: 3-Bulb
grailq	Num	8	Left - Plaque Grade: ICA
graelq	Num	8	Left - Plaque Grade: ECA

Variable	Type	Len	Label
cap1lq	Num	8	Left - Calcified Plaque: 1-Prox CCA
cap2lq	Num	8	Left - Calcified Plaque: 2-Distal CCA
cap3lq	Num	8	Left - Calcified Plaque: 3-Bulb
capilq	Num	8	Left - Calcified Plaque: ICA
capelq	Num	8	Left - Calcified Plaque: ECA
form_completed	Num	8	Person completing form
date_completed	Num	8	Date Visit 2 In-Person status reported by partic
entryid	Char	8	Person entering form data
visitcode	Num	8	Visit Code
subject	Num	8	Study ID
lesL	Num	8	Number of Plaques at left side
LesR	Num	8	Number of Plaques at right side
Les	Num	8	Total number of plaques
LesLD	Num	8	Plaque Y/N at left side
LesRD	Num	8	Plaque Y/N at right side
LesD	Num	8	Plaque Y/N
PIL	Num	8	Left plaque index
PIR	Num	8	Right plaque index
PI	Num	8	Aggregate of left and right plaque index
pvisual	Num	8	Any plaque visualized
PIL_min	Num	8	Imputed minimum plaque index at left side
PIR_min	Num	8	Imputed minimum plaque index at right side
PI_min	Num	8	Imputed minimum plaque index
flag_plaq	Num	8	Flag of plaque index

SECTION VII. REFERENCES

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APPENDIX I. DATA COLLECTION FORMS

1. URL CAROTID IMT WORKSHEET WITH VARIABLE NAMES

LONG LIFE FAMILY STUDY

(Affix Label Here)

Participant ID: ID

Participant Name Code: INITS

Exam Date:
☐☐☐☐☐☐☐☐ DATE
d d M M M y y y y
(e.g., 10JUN2005)

Tech Code: ☐☐☐ STAFFNO

Circle Field Center Location:
BU CU DK UP
FC

URL Carotid IMT Worksheet

Participant Name Code: INITS CD #: CD *Repro only:* Test Seq: SCAN

Was Carotid Exam completed? Yes ( )
No ( ) Specify reason(s): EXCOMP ( ) …Equipment problem MECH ( ) …participant unable PPTU
( ) ……..Participant refused REFUSE ( )…not enough time TIME
( ) ……..Other OTHER

A. Right Plaque Index

	1-Prox CCA	2-Distal CCA	3-Bulb	ICA	ECA
1. Segment adequately visualized	Y ( ) N ( ) VISIR	Y ( ) N ( ) VIS2R	Y ( ) N ( ) VIS3R	Y ( ) N ( ) VIS4R	Y ( ) N ( ) VIS6R
2. Any plaques visualized	Y ( ) Go to A3		N ( ) Go to A6	PVISUALR	
3. No. of Lesions	LES1R	LES2R	LES3R	LESIR	LESER
4. Plaque Grade* (0, 1, 2, 3)	GRA1R	GRA2R	GRA3R	GRAIR	GRAER
5. Calcified Plaque	Y ( ) N( ) CAP1R	Y ( ) N( ) CAP2R	Y ( ) N( ) CAP3R	Y ( ) N( ) CAPIR	Y ( ) N( ) CAPER

**Velocities done if Plaque Grade is ≥ 3 in any segment please complete URL Carotid Doppler Velocity Worksheet*

6. ☐ ANT (15° to 60°) ANANTR	☐ LAT(10° to -10°) ANLATR	☐ POST (-15° to -60°) ANPOSR
7. Technically Difficult Study (TDS) ☐ YES* → TDSR ☐ NO Go to 8	Specify reason (s) : ☐ Tortuous vessel TVR ☐ Participant movement PMR	☐ Deep Vessels DVR ☐ Morbidly obese MOR ☐ Other OTH
8. Machine Failure ☐ YES * Indicate reason for machine failure ☐ NO MECHR Go to B		

*Additional Comments: COMMENTR

Participant ID: ID Exam Date: DATE

B. Right Plaque and Wall thickening

ICA Anterior ECA Anterior

C. Left Plaque Index

	1-Prox CCA	2-Distal CCA	3-Bulb	ICA	ECA
1. Segment adequately visualized	Y( ) N( ) VIS1L	Y( ) N( ) VIS2L	Y( ) N( ) VIS3L	Y( ) N( ) VIS4L	Y( ) N( ) VIS6L
2. Any plaques visualized	Y( ) Go to C3		N( ) Go to C6	PVISUALL	
3. No. of Lesions	LES1L	LES2L	LES3L	LESIL	LESEL
4. Plaque Grade* (0, 1, 2, 3)	GRA1L	GRA2L	GRA3L	GRAIL	GRAEL
5. Calcified Plaque	Y( ) N( ) CAP1L	Y( ) N( ) CAP2L	Y( ) N( ) CAP3L	Y( ) N( ) CAPIL	Y( ) N( ) CAPEL

Velocities done if Plaque Grade is ≥ 3 in any segment please complete URL Carotid Doppler Velocity Worksheet

6. ❑ ANT (15° to 60°) ANANTR	❑ LAT(10° to -10°) ANLATR	❑ POST (-15° to -60°) ANPOSR
7. Technically Difficult Study (TDS) ❑ YES* → TDSL ❑ NO Go to 8	Specify reason (s) : ❑ Tortuous vessel TVL ❑ Participant movement PML	❑ Deep Vessels DVL ❑ Morbidly obese MOL ❑ Other OTH
8. Machine Failure ❑ YES * Indicate reason for machine failure	❑ NO MECHL	Go to D

*Additional Comments: COMMENTL

D. Left Plaque and Wall thickening

ICA Anterior ECA Anterior

2. CAROTID DUPLEX SCAN FEEDBACK FORM WITH VARIABLE NAMES

Ultrasound Research Lab

Carotid Duplex Scan Feedback Form

Study: LLFS Machine: GE Logiq e

Study ID: ID **Participant Name Code: INITS** **Tech ID: STAFFNO** **Scan Date: DATE**

CQI Tech ID: CQI **CQI Date: DOCQI** *Repro only:* Test Seq: SCAN CQI Seq: READ

IMT Images:	Right				Left			
	CCA #1	CCA #2	CCA #3	CCA #4	CCA #5	CCA #6	CCA #7	CCA #8
Lumen and walls optimized	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N
Captured on the upstroke of the R wave	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N
Bulb clearly visualized in image	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N	☐Y☐N
Overall image quality*	IQ1R	IQ2R	IQ3R	IQ4R	IQ5L	IQ6L	IQ7L	IQ8L

* If ≤ 2 then comment required. Score reference codes: 4 – excellent, 3 – good, 2 – poor, 1 – unreadable

RT CCA-#1: COMM1R LT CCA-#5: COMM5L

RT CCA-#2: COMM2R LT CCA-#6: COMM6L

RT CCA-#3: COMM3R LT CCA-#7: COMM7L

RT CCA-#4: COMM4R LT CCA-#8: COMM8L

Sonographer/scanner agreement on plaque assessment? ❑ Y ❑ N SSAPR

Can plaque assessment be made with clips provided (RT): ❑ Y ❑ N PAMCR

Right Plaque Index

	1-Prox CCA	2-Distal CCA	3-Bulb	ICA	ECA
1. Segment adequately visualized	Y( ) N( ) VIS1RQ	Y( ) N( ) VIS2RQ	Y( ) N( ) VIS3RQ	Y( ) N( ) VIS4RQ	Y( ) N( ) VIS6RQ
2. Any plaques visualized	Y( ) Go to 3	N( ) Go to Left Plaque Index PVISUALRQ			
3. No. of Lesions	LES1RQ	LES2RQ	LES3RQ	LESIRQ	LESERQ
4. Plaque Grade* (0, 1, 2, 3)	GRA1RQ	GRA2RQ	GRA3RQ	GRAIRQ	GRAERQ
5. Calcified Plaque	Y( ) N( ) CAP1RQ	Y( ) N( ) CAP2RQ	Y( ) N( ) CAP3RQ	Y( ) N( ) CAPIRQ	Y( ) N( ) CAPERQ

Sonographer/scanner agreement on plaque assessment? ❑ Y ❑ N SSAPL

Can plaque assessment be made with clips provided (LT): ❑ Y ❑ N PAMCL

Left Plaque Index

	1-Prox CCA	2-Distal CCA	3-Bulb	ICA	ECA
1. Segment adequately visualized	Y( ) N( ) VIS1LQ	Y( ) N( ) VIS2LQ	Y( ) N( ) VIS3LQ	Y( ) N( ) VIS4LQ	Y( ) N( ) VIS6LQ
2. Any plaques visualized	Y( ) Go to 3	N( ) Go to Left Plaque Index PVISUALLQ			
3. No. of Lesions	LES1LQ	LES2LQ	LES3LQ	LESILQ	LESELQ
4. Plaque Grade* (0, 1, 2, 3)	GRA1LQ	GRA2LQ	GRA3LQ	GRAILQ	GRAELQ
5. Calcified Plaque	Y( ) N( ) CAP1LQ	Y( ) N( ) CAP2LQ	Y( ) N( ) CAP3LQ	Y( ) N( ) CAP4IQ	Y( ) N( ) CAPELQ

APPENDIX II: LABELS FOR VARIABLES NOT INCLUDED IN THE FROZEN DATASET BUT USED TO COMPUTE CREATED CAROTID VARIABLES:

```
tcmfr1='New CCA Right Far Wall Minimum Mean IMT -- image1'
tcmfr2='New Far Wall Minimum Mean IMT -- image2'
tcmfr3='Original CCA Right Far Wall Minimum Mean IMT -- image1'
tcmfr4='Original CCA Right Far Wall Minimum Mean IMT -- image2'

tcmfl1='New  CCA Left Far Wall Minimum Mean IMT-- image1'
tcmfl2='New  CCA Left Far Wall Minimum Mean IMT-- image2'
tcmfl3='Original CCA Left Far Wall Minimum Mean IMT-- image1'
tcmfl4='Original CCA Left Far Wall Minimum Mean IMT-- image2'

tcxfr1='New CCA Right Far Wall Maximum Mean IMT -- image1'
tcxfr2='New CCA Right Far Wall Maximum Mean IMT -- image2'
tcxfr3='Original CCA Right Far Wall Maximum Mean IMT -- image1'
tcxfr4='Original CCA Right Far Wall Maximum Mean IMT -- image2'

tcxfl1='New CCA Left Far Wall Maximum Mean IMT-- image1'
tcxfl2='New CCA Left Far Wall Maximum Mean IMT-- image2'
tcxfl3='Original CCA Left Far Wall Maximum Mean IMT-- image1'
tcxfl4='Original CCA Left Far Wall Maximum Mean IMT-- image2'

tcmnr3='Original CCA Right Near Wall Minimum Mean IMT-- image1'
tcmnr4='Original CCA Right Near Wall Minimum Mean IMT-- image2'

tcmnl3='Original CCA Left Near Wall Minimum Mean IMT-- image1'
tcmnl4='Original CCA Left Near Wall Minimum Mean IMT-- image2'

tcxnr3='Original CCA Right Near Wall Maximum Mean IMT-- image1'
tcxnr4='Original CCA Right Near Wall Maximum Mean IMT-- image2'

tcxnl3='Original CCA Left Near Wall Maximum Mean IMT-- image1'
tcxnl4='Original CCA Left Near Wall Maximum Mean IMT-- image2'

L41mr3='Original CCA MEAN min LUMEN DIAMETER RIGHT--image1'
L42mr4='Original CCA MEAN min LUMEN DIAMETER RIGHT--image2'
L41ml3='Original CCA MEAN min LUMEN DIAMETER LEFT--image1'
L42ml4='Original CCA MEAN min LUMEN DIAMETER LEFT--image2'

L41xr3='Original CCA MEAN max LUMEN DIAMETER RIGHT--image1'
L42xr4='Original CCA MEAN max LUMEN DIAMETER RIGHT--image2'
L41xl3='Original CCA MEAN max LUMEN DIAMETER LEFT--image1'
L42xl4='Original CCA MEAN max LUMEN DIAMETER LEFT--image2'

TCSDNr3='Original MEAN AVERAGE CCA NEAR WALL IMT STANDARD DEVIATION RIGHT--
image1'
TCSDNr4='Original MEAN AVERAGE CCA NEAR WALL IMT STANDARD DEVIATION RIGHT--
image2'
TCSDNl3='Original MEAN AVERAGE CCA NEAR WALL IMT STANDARD DEVIATION LEFT--
image1'
TCSDNl4='Original MEAN AVERAGE CCA NEAR WALL IMT STANDARD DEVIATION LEFT--
image2'

TCLENNr3='Original MEAN AVERAGE CCA NEAR WALL IMT LENGTH RIGHT--image1
TCLENNr4='Original MEAN AVERAGE CCA NEAR WALL IMT LENGTH RIGHT--image2'
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      TCLENNl3='Original MEAN AVERAGE CCA NEAR WALL IMT LENGTH LEFT--image1'
      TCLENNl4='Original MEAN AVERAGE CCA NEAR WALL IMT LENGTH LEFT--image2'

      TCSDFr3='Original MEAN AVERAGE CCA FAR WALL IMT STANDARD DEVIATION RIGHT--
      image1'
      TCSDFr4='Original MEAN AVERAGE CCA FAR WALL IMT STANDARD DEVIATION RIGHT--
      image2'
      TCSDFl3='Original MEAN AVERAGE CCA FAR WALL IMT STANDARD DEVIATION LEFT--
image1'
      TCSDFl4='Original MEAN AVERAGE CCA FAR WALL IMT STANDARD DEVIATION LEFT--
image2'

      TCLENFr3='Original MEAN AVERAGE CCA FAR WALL IMT LENGTH RIGHT--image1'
      TCLENFr4='Original MEAN AVERAGE CCA FAR WALL IMT LENGTH RIGHT--image2'
      TCLENFl3='Original MEAN AVERAGE CCA FAR WALL IMT LENGTH LEFT--image1'
      TCLENFl4='Original MEAN AVERAGE CCA FAR WALL IMT LENGTH LEFT--image2'

      L4SDr3='Original MEAN AVERAGE CCA LUMEN DIAMETER STANDARD DEVIATION RIGHT--
      image1'
      L4SDr4='Original MEAN AVERAGE CCA LUMEN DIAMETER STANDARD DEVIATION RIGHT--
      image2'
      L4SDl3='Original MEAN AVERAGE CCA LUMEN DIAMETER STANDARD DEVIATION LEFT-
image1'
      L4SDl4='Original MEAN AVERAGE CCA LUMEN DIAMETER STANDARD DEVIATION LEFT--
      image2'

      L4LENr3='Original MEAN AVERAGE CCA LUMEN DIAMETER LENGTH RIGHT--image1'
      L4LENr4='Original MEAN AVERAGE CCA LUMEN DIAMETER LENGTH RIGHT--image2'
      L4LENl3='Original MEAN AVERAGE CCA LUMEN DIAMETER LENGTH LEFT--image1'
      L4LENl4='Original MEAN AVERAGE CCA LUMEN DIAMETER LENGTH LEFT--image2'

      ADMINr3='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER  RIGHT--image1'
      ADMINr4='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER  RIGHT--image2'
      ADMINl3='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER  LEFT--image1'
      ADMINl4='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER  LEFT--image2'

      ADMAXr3='Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER  RIGHT--image1'
      ADMAXr4='Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER  RIGHT--image2'
      ADMAXl3='Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER  LEFT--image1'
      ADMAXl4='Original MEAN MAXIMUM CCA ADVENTITIAL DIAMETER  LEFT--image2'

      ADSDr3='Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER STANDARD DEVIATION
RIGHT-      -image1'
      ADSDr4='Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER STANDARD DEVIATION
RIGHT-      -image2'
      ADSDl3='Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER STANDARD DEVIATION
LEFT--      image1'
      ADSDl4='Original MEAN AVERAGE CCA ADVENTITIAL DIAMETER STANDARD DEVIATION
LEFT--      image2'

      ADLENr3='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER LENGTH RIGHT--image1'
      ADLENr4='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER LENGTH RIGHT--image2'
      ADLENl3='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER LENGTH LEFT--image1'
      ADLENl4='Original MEAN MINIMUM CCA ADVENTITIAL DIAMETER LENGTH LEFT--image2'
```

APPENDIX III: LLFS CAROTID DATA FLAGS

Date this file last updated: 07/13/2018
Developed by: University of Pittsburgh Ultrasound Research Lab (LLFS Ultrasound Reading Center)
Date of scan (DOS) dates: 10/12/2014-11/30/2017
Read dates (DOR): 11/06/2014-12/11/2017
LLFS IMT Raw Data: Total N=2680
LLFS IMT Frozen Data for Analysis: Total N=2665

Data Check Codes

This appendix includes data from the **carotidfunc.sas7bdat** dataset that were flagged by the URL for checking.

The following codes were created for carotid IMT data checked to describe how the reading center recommends individual observations should be handled for analyses. A more detailed description explaining the determination of these codes is included below in the data check table **(n=304)**.

B1 – Use data as is (n=249)
(BU-58; CU-65; DEN-68; PGH-58)
B2 – Drop observation (n=10)
(BU-2; CU-0; DEN-5; PGH-3)
B3 – Caution recommended (n=38)
(BU-9; CU-6; DEN-14; PGH-9)
B4 – Modification recommended (n=6)
(BU-0; CU-1; DEN-3; PGH-2)

Five observations were flagged as modification recommended that you may calculate based on minimum data available with caution.

Boston Site (n=69)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
20142428	108	20142428	03/15/2016	Missing reads	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Images 3, 4, 6, 7, 8	**May use available data for analysis. May use tcaf with caution.**	**B3**

					unreadable. Reread for AD. LD could not be obtained.		
20736872	125	20736872	01/20/2016	Low mavg_cca (0.582)	Thin walls.	**Use data as is.**	**B1**
20845476	125	20845476	03/31/2016	Low mmax_cca (0.603)	TDS. Deep vessels. Morbidly obese. Thin walls. Good read.	**Use data as is.**	**B1**
20877486	49	20877486	02/01/2016	Right side fw reads are missing	URL REREAD	**Use reread data as is.**	**B1**
20880449	125	20880449	1/22/2016	Low mavg_cca (0.541)	Thin walls.	**Use data as is.**	**B1**
20972527	125	20972527	09/30/2015	High mavg_cca (1.570)	Rt NW thickening. Lt FW plaque.	**Use data as is.**	**B1**
21133577	108	21133577	05/26/2015	High adavg (10.02)	Rt NW plaque.	**Use data as is.**	**B1**
21304530	49	21304530	07/09/2016	High mmax_cca (1.311)	TDS. Tortuous vessel. Very low bifurcation. Bulb at collar bone so difficult to capture in long. Rt & Lt thickening. Lt CCA plaque.	**Use data as is.**	**B1**
21785854	108	21785854	05/14/2015	High mavg_cca (1.329)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
21860755	108	21860755	04/29/2015	Tcafl was missing	TDS. Morbidly obese. Images 5 & 6 unreadable. Images 7 & 8 FWs unreadable.	**May use available Rt side data for analysis**	**B1**
21908595	108	21908595	06/05/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Deep vessels. Morbidly obese. Not able to read AD/LD.	**May use available Rt side for analysis.**	**B1**
21958137	49	21958137	07/09/2015	High mavg_cca (1.013)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
22035597	125	22035597	07/18/2017	Reader Comments: image 1&2 unreadable,	TDS. Deep vessels. Morbidly obese. Very hard to visualize walls on Rt side. Participant was overweight/had a thick	**Dropped Image 3 NW.**	**B3**

				image 3&4 barely readable. Missing data for right side, mavg_cca, mmax_cca, and mmin_cca. Missing ADAVGr read.	neck. Very dark scout scans, especially in transverse. Images 1 & 2 unreadable. Image 3 NW <1cm. URL reread for AD.	**May use available data for analysis. May use ADAVG and tcaf with caution.**	
22221396	49	22221396	02/16/2016	High mavg_cca (1.029)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
22226625	108	22226625	03/10/2016	High mavg_cca (1.208)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
22283618	125	22283618	2/4/2017	Re-read comments: image7 NW unreadable; image8 NW unreadable. mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, mmin_cca are missing. Missing ALDL.	Difficult NWs. Images 7 & 8 NWs unreadable. Cannot obtain LD.	**May use available data. May use ADAVG with caution.**	**B3**
22285994	108	22285994	03/25/2015	A lot of missing values due to unreadable images.	TDS. Only Rt FW readable. Images 3-8 unreadable. Reread for AD. LD not able to obtain.	**May use available data for analysis with caution.**	**B3**
22306583	108	22306583	04/07/2015	Missing data of birth.	DOB: Participant refused SDI. No DOB provided.	**Use data as is.**	**B1**
22446864	10	22446864	11/18/2014	Reader Comments: Image 5~8 unreadable. Missing: all data for left side, mavg_cca , mmax_cca, mmin_cca. Missing ADAVGI, ALDL.	TDS. Very difficult scan. Participant had very little mobility in the neck which made it extremely difficult to visualize the artery. Could not adequately visualize the artery to identify plaque. Same for left side. Unable to read AD/LD.	**May use available right side data.**	**B3**

22449315	125	22449315	05/12/2017	Low mavg_cca (0.50488), and low mmax_cca (0.6135).	EKG noisy due to participant's dog jumping on and off the couch multiple times. Thin walls.	**Use data as is.**	**B1**
23230444	108	23230444	03/28/2015	Missing ADAVGI, ADAVG, ALDL, ALD.	Reread for AD/LD.	**Use data as is.**	**B1**
23389638	108	23389638	04/17/2017	Re-read comments: image3 NW unreadable FW poor cut; image4 NW unreadable, FW cut. Staffno, dor, mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, and tcafr are missing. Missing ALDR read.	TDS. Participant Movement. Deep vessels. Extremely difficult scan. Near impossible to capture any walls, very deep vessel. Also, participant was very fidgety because they did not like the sensation of the gel/proble. Images 1 & 2 unreadable. Images 3 & 4 NWs unreadable. Images 1 & 2 too blurred for AD. NWs unreadable for LD.	**May use available data for analysis. Use ADAVG with caution.**	**B3**
24063265	108	24063265	06/18/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Deep vessels. Morbidly obese. AD/LD could not be read.	**Use only Rt side for analysis.**	**B1**
24118739	125	24118739	01/26/2017	Low mavg_cca (0.563)	Participant had thin walls. Good read.	**Use data as is.**	**B1**
24185168	125	24185168	01/20/2016	Right side reads are missing	Rt side images unreadable since not distal CCA. No bulb is seen in images.	**Use only Lt side data for analysis.**	**B1**
24226722	125	24226722	12/20/2016	AD/LD flag	URL reread for AD/LD	**Use reread data as is.**	**B1**
24491979	125	24491979	08/15/2016	Left side fw reading is missing	URL to reread. Lt side Images 5 & 6 are readable but were not read.	**Use reread data as is.**	**B1**
24966145	49	24966145	05/06/2015	High mavg_cca (1.334), and high mmax_cca (1.527)	Significant NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**

25151168	49	25151168	07/27/2015	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Participant refused after scan started so data was dropped.	**Drop observation.**	**B2**
25392184	49	25392184	07/01/2015	Very low measures (mavg_cca=0.585)	Very thin NW & FW both sides.	**Use data as is.**	**B1**
25421314	108	25421314	04/06/2015	High mavg_cca value (1.90), left side reading's missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Rt FW thickening. Rt NW plaque. Lt side readable. Participant had difficulty moving neck. AD/LD could not be read.	**Use only Rt side for analysis.**	**B1**
25707754	108	25707754	03/28/2015	High mavg_cca value (1.23)	FW plaque both Rt & Lt sides.	**Use data as is.**	**B1**
25970799	108	25970799	05/28/2015	High mmax_cca (1.630)	R FW very thick.	**Use data as is.**	**B1**
26104331	49	26104331	03/11/2015	Low value on mavgl_cca (0.444)	The left side images were captured in mid CCA. Mid and distal segments can vary considerably in its mavg	**Dropped left side data due to improper segment.** **Use right side data for analysis.**	**B1**
26331653	108	26331653	03/15/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	No images 5-8. PPT unable to lay flat. Unable to move neck. Kept swallowing. AD/LD could not be read.	**Use Rt side data only for analysis.**	**B1**
26453122	108	26453122	05/17/2015	High mavg_cca (1.235)	Rt & LT FW thickening.	**Use data as is.**	**B1**
26458745	10	26458745	11/10/2014	High mavg_cca (1.2395) reads.	Rt & Lt heavy NW & FW thickening.	**Use data as is.**	**B1**
26538679	108	26538679	05/13/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Pt. asked to stop scan after scanning Rt side. AD/LD could not be read.	**Use only Rt side for analysis.**	**B1**
26553843	125	26553843	03/25/2017	Low mavg_cca (0.581)	TDS. Tortuous vessel. Thin walls. Good read.	**Use data as is.**	**B1**

26725979	108	26725979	07/29/2015	Right side readings were missing. Missing ADAVGr, ADAVG, ALDr, ALD.	Difficult scan. Pt needed to use a pillow. Could not capture walls on Rt side. AD/LD could not be read.	**Use only Lt side for analysis.**	**B1**
26868810	49	26868810	01/23/2015	High mavg_cca (0.964)	Notable NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**
27077270	125	27077270	05/10/2016	Low mavg_cca (0.582)	TDS. Tortuous vessel. Thin walls.	**Use data as is.**	**B1**
27205161	125	27205161	08/22/2017	Reader Comments: Image 5~8 unreadable. Missing: all data for left side, mavg_cca , mmax_cca, mmin_cca. Missing ADAVGI, ALDL.	Images 5-8 unreadable. AD/LD could not be read.	**Use available Rt side data for analysis.**	**B1**
27392364	108	27392364	05/12/2015	Very low measures (mavg_cca=0.573)	Poor walls. Deep vessel. Hard to reach pt. Thin walls. Readable.	**Use data as is.**	**B1**
27462878	125	27462878	08/22/2017	Reader Comment: Image 6 unreadable. Missing: tcafl2, tcmfl2.	TDS. Carotid ultrasound was done outside since participant didn't want to be in their house. There was extreme glare due to sun which made it very tough to see what was on the screen. Image 6 unreadable.	**Use data as is.**	**B1**
27656438	49	27656438	01/14/2016	Right side readings were missing.	Rt side Images 3 & 4 missing. TDS. Pt movement. Deep vessels. Pt had metal plate in head so could not turn head. Pt swallowed a lot. Reread for AD/LD.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
27950096	49	27950096	12/07/2015	High mavg_cca (1.234)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
27990795	108	27990795	04/03/2015	High mavg_cca value (1.34)	Rt FW plaque and both Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**

28037299	49	28037299	03/02/2016	High mavg_cca (1.305)	Thickening Rt & Lt.	**Use data as is.**	**B1**
28059856	108	28059856	03/06/2015	Miss left side readings. Missing ADAVGI, ADAVG, ALDL, ALD.	Machine died & participant did not have 3 prong outlet to recharge. No Lt side images provided. AD/LD could not be read.	**Use only Rt side for analysis.**	**B1**
28116523	125	28116523	03/24/2017	High mavg_cca (1.027)	Rt & Lt NW & FW heavy thickening.	**Use data as is.**	**B1**
28276095	108	28276095	08/13/2015	Right side readings were missing	TDS. Tortuous vessel. Deep vessels. Unable to bring in any walls on Rt side. Lt side images 5 & 7 unreadable. Image 8 less than 1 cm.	**Drop observation.**	**B2**
28886034	49	28886034	08/23/2017	Missing mavglcca, mavg_cca,mmaxl_cca, mmax_cca, mminl_cca, mmin_cca, tcafl. Missing ADAVGI, ALDL.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Lt side images unreadable. AD/LD could not be read.	**May use available Rt side images for analysis.**	**B1**
28958692	125	AARST	10/25/2017	Low mavg_cca (0.599).	Thin walls.	**Use data as is.**	**B1**
29061736	49	29061736	05/01/2016	Low mavg_cca (0.524)	Participant had thin walls. Good read.	**Use data as is.**	**B1**
29260031	49	29260031	04/18/2017	High mavg_cca (1.38288), high mmax_cca (1.742).	TDS. Participant movement. Participant snoring while sleeping made walls tough to capture. Participant was not obese, but quite large. Rt & Lt NW & FW thickening and bulb plaque extending into Rt CCA reading area.	**Use data as is.**	**B1**
29506426	125	29506426	06/15/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD,	TDS. Tortuous vessel. Images 5-8 unreadable. Reread for AD/LD.	**Use Rt side data for analysis.**	**B1**

29569804	49	29569804	06/03/2016	High mavg_cca (1.055)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
29638764	125	29638764	09/27/2016	Left side fw reading is missing	TDS. Very low bulb. Unable to visualize proximal CCA. Tortuous vessel so unable to visualize walls. Participant also required pillow. No images 5, 6 or 8. Image 7 NW missing.	**May use available data.**	**B1**
29730504	125	29730504	01/17/2017	Low mavg_cca (0.595)	Very pulsatile vessel. Thin walls. Good read.	**Use data as is.**	**B1**
30999924	108	30999924	03/08/2016	Missing ADAVGr, ADAVGI, ADAVG, ALDR, ALDL, ALD.	TDS. Deep vessels. Morbidly obese. Only have Images 1 & 2 and both are cut. No images 3-8. Reread for AD. LD could not be obtained.	**May use available data for analysis.**	**B1**
31577894	125	31577894	05/12/2017	Missing mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, mmin_cca. ALDL reads. (re-read data)	TDS. Deep vessels. Morbidly obese. Images 6, 7, & 8 unreadable. URL read for AD/LD.	**Use available for analysis. May use tcaf and ADAVG with caution.**	**B3**
32331944	49	32331944	05/13/2017	Low mavg_cca (0.53813), low mmax_cca (0.647).	Thin walls.	**Use data as is.**	**B1**
33475287	108	33475287	04/20/2017	Low mavg_cca (0.571)	Participant had thin walls. Good read.	**Use data as is.**	**B1**
34449207	108	34449207	10/04/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Lt images 7 & 8 unreadable. AD/LD could not be read.	**Use available data for analysis.**	**B1**
34715210	108	34715210	10/01/2015	High mavg_cca (1.239)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
37899499	108	37899499	04/04/2015	Miss right side readings. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Participant could not move neck. Images 1-4 unreadable. Lt FW thickening.	**Use Lt side data for analysis.**	**B1**

					Lt NW unreadable. AD/LD not able to be read.		
38206512	108	38206512	06/17/2015	High mavg_cca (1.244)	Rt & Lt NW & FW thickening. NW on Image 3 unreadable.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
39490685	125	39490685	10/02/2015	High mavg_cca (1.347)	Rt NW thickening. Lt NW & FW thickening.	**Use data as is.**	**B1**

Columbia (n=72)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
28006021	49	HURJA	04/26/2016	High mavg_cca (1.69) Right side reads are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Tortuous vessel. PPT sitting upright, limited mobility, thickening NW & FW. Right side images missing. AD/LD unable to be read.	**Use only Lt side for analysis.**	**B1**
30638084	10	BOLLY	04/05/2016	Left side reads are missing	TDS. Tortuous vessel. Unable to visualize. Lt side images missing.	**Use Rt side data only for analysis.**	**B1**
34361816	108	DRETR	10/23/2016	Low mavg_cca (0.586)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
35636232	125	SPAJO	06/02/2016	Missing reads	EKG monitor not displaying. Only captured Image 5.	**May use available data.**	**B1**
36552059	49	HOCSA	07/24/2015	High mavg_cca value (1.233)	Rt & Lt NW & FW thickening. RA accidentally deleted Image 7 & cannot recover.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
38254199	125	MOSJO	09/30/2015	High adavg (10.27)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
40399610	10	ELIAL	05/27/2015	High mavg_cca (1.062)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
40402166	321	ANSJE	04/16/2015	High mavg_cca value (1.32)	NW & FW thickening both RT & Lt sides.	**Use data as is.**	**B1**

40494239	10	CARDO	09/30/2016	Fw left reading is missing	TDS. Deep vessels. High bifurcation. Image 3 FW unreadable. Images 5 & 6 unreadable. Image 8 NW unreadable.	**Calculated tcaf w/FW Images 7 & 8. May use ADAVG with caution.**	**B4**
40705783	10	CONJO	04/30/2015	Miss left side images. Missing ADAVGI, ADAVG, ALDL, ALD.	Tech notes on WS not enough time to perform Lt exam. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
40717019	10	MCFKA	10/01/2015	Low mmax_cca (0.70)	Thin walls.	**Use data as is.**	**B1**
40781859	125	MCCPA	03/30/2017	High mavg_cca (1.193)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
40952012	10	KALDE	05/02/2015	High mavg_cca value (1.21)	TDS. Deep vessels. Morbidly obese. Rt & Lt side NW & FW thickening.	**Use data as is.**	**B1**
41141805	49	PFESU	01/20/2016	Low mavg_cca (0.58)	Thin walls.	**Use data as is.**	**B1**
41240029	125	TRAJU	08/19/2015	Reread	Images 7 & 8 unreadable.	**May use available data. Use ADAVG with caution.**	**B3**
41272654	10	TINLE	08/16/2015	High mavg_cca value (1.361)	Rt & Lt NW & FW thickening. Lt FW plaque.	**Use data as is.**	**B1**
41407594	125	BUOPA	1/25/2017	AD/LD flag	URL will reread	**Use reread data as is.**	**B1**
41532632	49	BUFBR	07/06/2017	Reader Comment: Image 7&8 nw unreadable.	TDS. Shadowing – unable to visualize walls. Images 7 & 8 NW unreadable.	**May use available data for analysis. Use ADAVG with caution.**	**B3**
41666645	10	COLBE	02/17/2015	Mavgl_cca and mmaxl_cca are missing. High mavg_cca (1.247), high adavg (11.355). Missing ADAVGI, ADAVG, ALDL, ALD.	LT side images 5-8 were not readable. AD/LD unable to be read.	**May use available Rt side data.**	**B1**

41677667	10	BATSA	01/30/2015	Missing ADAVGI, ADAVG, ALDL, ALD reads.	Images 5-8 not provided. AD/LD unable to be read.	**Use available Rt side data for analysis.**	**B1**
41693685	49	41693685	01/26/2016	High mmax_cca (1.21) Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Rt NW & FW thickening. Lt side no images. PPT refused. AD/LD unable to be reread.	**Use Rt side data only for analysis.**	**B1**
41855744	108	BRARI	03/26/2015	Miss right side images. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Participant done sitting up in wheelchair. Rt side unreadable. AD/LD unable to be read.	**Use Lt side data for analysis.**	**B1**
42162723	125	WHIRE	01/06/2016	High mmax_cca (1.41)	TDS. Deep vessels. PPT movement. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
42207589	108	MANSH	06/13/2015	Low measures (mavg_cca = 0.555)	Rt & Lt very thin NW & FWs.	**Use data as is.**	**B1**
42224477	49	COHHA	12/13/2014	Missing ADAVGI, ADAVG, ALDL, ALD.	Images 5-8 equipment failure no images. AD/LD unable to be read.	**May use available Rt side data.**	**B1**
42229823	108	SEIDA	07/22/2015	High adavg > 10	Lt NW & FW thickening.	**Use data as is.**	**B1**
42361246	108	SANJE	06/15/2015	High adavg > 10	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
42445781	10	PAQCH	09/30/2016	Low mavg_cca (0.536)	Thin walls.	**Use data as is.**	**B1**
42522129	125	LAMMA	09/28/2015	Low mmax_cca (0.699)	Rt & Lt thin FW.	**Use data as is.**	**B1**
42528514	10	KALLE	05/02/2016	High mavg_cca value (1.61)	Rt FW plaque & NW thickening. Ft FW plaque & NW & FW thickening.	**Use data as is.**	**B1**
42555461	125	KOLNE	04/29/2017	High mavg_cca (1.083)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
42839365	49	SMIKE	03/31/2016	High mavg_cca (1.31)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**

42991307	10	FOWWA	03/04/2015	High mmax_cca (1.082)	Notable NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**
43259150	125	FELPA	03/03/2017	Low mavg_cca (0.509)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
43373695	49	KAPNA	04/26/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Lt side images not available. No explanation. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
43456954	125	DEUAB	11/12/2016	Left side readings are missing	Participant had endarterectomy performed on Lt side. Has stenosis. Reread for AD/LD.	**Use only right side data for analysis.**	**B1**
43800458	49	KELAR	07/01/2015	High mavg_cca (1.062)	Rt FW thickening & FW plaque. Lt Image 7 NW unreadable. FW plaque.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
43844661	108	JONVI	03/23/2015	Miss right side images. Missing ADAVGr, ADAVG, ALDR, ALD	TDS. Tortuous & deep vessel. Participant had difficulty moving head. Rt side images unreadable. Lt NW & FW thickening. AD/LD unable to be read.	**Use Lt side data for analysis.**	**B1**
43853076	10	HAWRO	03/01/2015	High mavg_cca (0.9648)	Notable NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**
43932045	49	SANTO	06/15/2015	High mmax _cca (1.22)	Rt & Lt NW & FW thickening. Lt NW plaque.	**Use data as is.**	**B1**
43955526	125	ATKPE	1/12/2017	AD/LD flag	URL will reread.	**Use reread data as is.**	**B1**
44364553	49	SCHED	08/30/2016	High mmax _cca (1.22)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
44439735	125	MANJO	09/13/2016	High adavg (11.18)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
44454734	49	SMILL	03/31/2016	High mavg_cca (1.27)	Rt & Lt NW & FW thickening. Rt CCA Plaque.	**Use data as is.**	**B1**

44724615	108	RUBWA	07/15/2015	High adavg > 10	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
44752822	108	KARRI	05/15/2015	High mavg_cca value (1.03)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
45378536	49	SANMI	07/08/2015	High mavg_cca value (1.258)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
45446424	49	BOWBE	01/15/2015	High mavg_cca (1.398), mmax_cca (1.716)	Notable NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**
45573269	108	EPSLI	08/02/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Lt Images 7 & 8 unreadable. AD/LD unable to be read.	**Use available Rt side data for analysis.**	**B1**
45830361	49	ELKAD	04/25/2016	Missing reads	TDS. PPT had limited mobility & time. Images 3-8 not captured. AD/LD unable to be read.	**May use tcafr only.**	**B1**
45832730	10	CARAR	04/28/2015	Miss left side images. Missing ADAVGI, ADAVG, ALDL, ALD.	Rt NW & FW thickening. Not enough time to do Lt side exam. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
45868338	49	CIERA	08/09/2017	Low mavg_cca (0.6965) reads.	Thin walls Lt side.	**Use data as is.**	**B1**
45923856	125	KAHTH	07/07/2017	High ADAVG (10.7888) reads.	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
46479101	108	ROTST	06/18/2015	High mavg_cca value (1.218)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
46948428	108	LAMDA	09/28/2015	High mmax _cca (1.26)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
46990610	49	MILRI	06/27/2015	High mmax_cca (1.024)	Notable NW and FW thickening bilaterally would account for higher than average values.	**Use data as is.**	**B1**

47020292	49	HENRO	03/02/2016	High mavg_cca value (1.693)	Rt NW & FW thickening & NW plaque. Lt NW & FW thickening & large FW plaque.	**Use data as is.**	**B1**
47117171	49	BEDTA	06/16/2015	High mmax _cca (1.24)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
47885258	125	BRAAR	09/14/2016	Low mavg_cca (0.57)	Thin walls.	**Use data as is.**	**B1**
47948179	10	BACCA	09/23/2015	Missing mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, mmin_cca, tacfl (re-read data)	TDS. Tortuous vessel. Participant movement. Image 3 NW unreadable. Images 5-6 unreadable. Images 7-8 FWs unreadable.	**May use FWs of Images 1-2 to calculate tcafr with caution. May use ADAVG with caution.**	**B3**
47968459	10	LAMGE	09/25/2015	High mavg_cca (1.29)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
47989272	108	DRAAL	09/18/2015	Left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Lt Images 5, 7 & 8 unreadable. TDS. Deep vessels. High bifurcation. Limited amount of time to perform scan. Pt had another appt. AD/LD unable to be read.	**Use available data for analysis. May use tcaf with caution.**	**B3**
48136238	108	EPSJO	08/02/2015	High adavg > 10	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
48140727	125	BERJO	01/06/2017	Left side readings are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Extremely tortuous vessel. Images 7 & 8 not captured. AD/LD unable to be read.	**May use available data.**	**B1**
48333546	10	BERAR	09/26/2016	High mavg_cca (1.25)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
48404909	49	ABEJO	03/03/2016	High mmax _cca (1.26)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
48425608	49	CISJO	06/30/2016	High mavg _cca (1.05)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
48472991	49	PETMA	03/30/2016	High adavg (10.11)	TDS. Tortuous vessel. Rt NW & FW thickening. Image 5 unreadable. Images 6-	**Use Rt side data for analysis.**	**B1**

				Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	8 not provided. No explanation. AD/LD unable to be read.		
48823298	49	BARRI	01/12/2016	High mavg_cca (1.26)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
48968218	125	SMIJI	11/13/2016	High mavg_cca (1.010)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
49383550	10	LAMEL	09/21/2016	Low mavg_cca (0.57)	Thin walls.	**Use data as is.**	**B1**
49964893	108	COHLE	06/06/2015	High adavg > 10	Rt NW thickening. Lt NW & FW thickening.	**Use data as is.**	**B1**

Denmark (n=90)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
10295187	10	VANAN	08/12/2015	Missing ADAVGr, ADAVGI, ADAVG, ALDR, ALDL, ALD.	Reread for AD. LD could not be obtained.	**Use data as is.**	**B1**
10313088	49	LYSRA	11/20/2014	Missing ADAVGr, ADAVG, ALDR, ALD reads.	Right side images were of the ICA and not the CCA. AD/LD could not be read.	**May use left side data.**	**B1**
10422616	125	JOERE	08/29/2017	Reader Comment: Image 3&4 thick/plq, image 5 unreadable. Missing: tcafl1, tcmfl1, tcxfl1,	TDS. Deep vessels. Morbidly obese. Short neck.Image 5 unreadable.	**Use data as is.**	**B1**
10455641	125	GULLE	12/07/2016	Right side readings are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Very short neck. Images 1-4 unreadable. AD/LD unable to be read.	**Use left side data for analysis.**	**B1**
10512482	125	MOECH	07/13/2016	High mavg_cca (1.37)	TDS. Could not lie without pillows. Images 7-8 NW unreadable.	**May use available data. Use ADAVG with caution.**	**B3**

10540624	49	Illth	05/03/2017	High mavg_cca (1.18538), high mmax_cca (1.55975).	Rt NW plaque. Lt NW thickening.	**Use data as is.**	**B1**
10666957	108	SORKA	10/07/2015	High adavg (10.43)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
10763563	49	soevi	03/01/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Difficult to prduce a right angle. Ran out of time. Images 5-8 not captured. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
10835230	49	SKOEL	07/04/2017	Incorrect DOS. Reader comment: No image 1~4. Missing: mavg_cca, mmax_cca, mmin_cca. Missing ADAVGr, ALDR.	Machine failure. Images 1-4 not provided due to being accidentally taken with abdominal setting. Lt FW thickening. AD/LD unable to be read.	**May use available left side data for analysis.**	**B1**
10838035	125	HJEEL	02/20/2017	Low mavg_cca (0.5887)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
11133287	108	SORKA	10/07/2015	Fw right reads are missing	Images 1-4 missing. No explanation.	**Use Lt side data for analysis.**	**B1**
17122375	125	BOMJO	09/30/2015	Missing reads	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Very short neck. No images are readable.	**Drop observation.**	**B2**
11358033	125	RASIN	06/29/2017	Reader comment: Image 6 not provided, image 7 cut both walls. Missing: tcafl2, tcmfl2, tcxfl2. Low mavg_cca (0.56563) reads, low mmax_cca (0.66763) reads.	TDS. Deep vessels. Morbidly obese. Image 6 not provided. Thin walls.	**Use available data as is.**	**B1**

11409794	108	NIEKN	03/23/2015	High in mavg_cca (1.236), mmax_cca (1.498), and adavg (12.889)	RT NW and FW plaque and LT NW and FW thickening would account for higher than average values.	**Use data as is.**	**B1**
11427151	125	JENOL	09/27/2017	Reader comment: Image 3&4 nw unreadable, image 7 cut nw, image 8 cut fw. Missing: mavg_cca, mmax_cca, mmin_cca. Missing ALDR read.	TDS. Deep vessels. High bifurcation. Images 3 & 4 NW unreadable. Cannot obtain Rt LD.	**Dropped Image 7 NW.** **May use available data for analysis. Use ADAVG with caution.**	**B3**
11458197	49	Krier	05/10/2017	High ADAVG (10.0853) reads.	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
11500205	49	linto	01/14/2016	High mavg_cca (1.215)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
11672128	125	JAKJO	10/28/2015	High adavg (10.29) Left side reads are missing.	TDS. Tortuous vessel. Morbidly obese. Pillow under head. Ran out of time. Images 3-4 no NW. Images 5-8 unreadable. Reread for AD/LD.	**May use available Rt side data for analysis.**	**B1**
12042024	10	HANAK	04/26/2016	High adavg (10.35)	TDS. Deep vessels. Morbidly obese. Very short neck and pillow under head. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
12187779	125	HESKA	06/07/2016	Low mavg_cca (0.60)	TDS. High bifurcation. Thin walls. Image 7 NW unreadable.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
12405420	125	MATNI	10/12/2015	High adavg (10.14)	TDS. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
12485943	108	JENKU	09/18/2017	Missing: TCSDFr4. High ADAVG (10.4863) reads.	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**

12494423	125	KLILI	3/9/2017	Re-read comment: image3 unreadable; image4 NW unreadable, cut FW; image7 Unreadable; image8 FW unreadable, cut NW. mavgr_cca, mavgl_cca, mavg_cca, mmaxr_cca, mmaxl_cca, mmax_cca, mminr_cca, mminl_cca, and mmin_cca are missing.	TDS. Deep vessels. Morbidly obese. Images 1 & 2 cut FW. Image 3 unreadable. Image 4 NW unreadable, cut FW. Image 5 cut FW. Image 6 cut FW. Image 7 unreadable. Image 8 FW unreadable, cut NW but not enough data.	**May use available data with caution.**	**B3**
12613329	49	fugin	05/10/2016	High mavg_cca (1.036)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
12669073	125	KRIHE	01/05/2017	Re-read comments: image3 cut FW, NW unreadable; image4 cut FW, NE unreadable; image5-7 unreadable; image8 cut NW, FW unreadable. mavgr_cca, mavgl_cca, mavg_cca, mmaxr_cca, mmaxl_cca, mmax_cca, mminr_cca, mminl_cca, mmin_cca, and tcafl are missing.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Image 2 FW cut. Image 3 NW unreadable, FW cut, Image 4 NW unreadable, FW cut. Images 5-7 unreadable. Image 8 FW unreadable, cut NW.	**May use available data with caution.**	**B3**
12767265	108	LAREJ	03/05/2015	High in mavg_cca (1.488), and mmax_cca (1.734)	Less than ideal images provided. Bilateral NW and FW thickening would account for higher than average values.	**Use data as is.**	**B1**
12906061	49	HANEL	11/25/2014	Reader comment: Image 3 missing.	Image 3 missing.	**Use available data as is.**	**B1**

12913794	49	benme	11/25/2015	Left fw reading was missing	URL reread.	**Use reread data as is.**	**B1**
13259791	125	SOESV	01/09/2017	High mavg_cca (1.016)	Rt NW & FW thickening. Lt NW thickening.	**Use data as is.**	**B1**
13302393	125	SONMO	11/24/2016	Missing ALDL	Cannot obtain LD.	**Use reread data as is.**	**B1**
13302633	125	STEBR	03/09/2017	Low mavg_cca (0.549)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
13333828	125	KLIKE	4/10/2017	Left side readings are missing; AD/LD flag	URL reread for AD/LD. Cannot obtain LD.	**Use reread data as is.**	**B1**
13548252	125	JOEHU	05/16/2017	Missing ADAVGr,ALDr reads.	TDS. Morbidly obese. Suffering from changes in the neck due to radiotherapy. Image 3 FW unreadable. Image 4 NW unreadable. Images 6 & 7 unreadable. Image 8 NW unreadable.	**May use available data for analysis.**	**B1**
13690862	108	KIRTO	09/19/2017	Reader comment: Image 1 cut-poor fw; image 2 cut fw; image3 fw cut, nw unreadable; image 4 ~ 8 unreadable. Missing mavg_cca, mmax_cca, mmin_cca.	TDS. Morbidly obese. Very short neck. Image 1 FW cut. Image 2 FW cut. Image 3 NW unreadable, FW cut. Images 4-8 unreadable.	**May use available data with caution.**	**B3**
13728340	49	rasir	03/01/2016	Low mavg_cca (0.52)	Thin walls.	**Use data as is.**	**B1**
13797816	125	SONAN	11/24/2016	Low mavg_cca (0.592)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
13938212	125	RANBR	02/21/2017	High mavg_cca (1.123)	TDS. Tortuous vessel. Morbidly obese. Rt NW plaque. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
14052930	125	ANDJE	10/12/2017	High ADAVG (10.7>10.0) (re-read data)	URL reread. NW & FW thickening. Reread for AD/LD.	**Use data as is.**	**B1**

14113336	125	SOEGU	01/12/2016	High mavg_cca (1.21)	Rt & Lt NW & FW Thickening.	**Use data as is.**	**B1**
14164669	108	SOENI	06/01/2017	Missing tcafl.	TDS. Deep vessels. Morbidly obese. Images 5 & 6 unreadable.	**May use available data for analysis. Calculated tcaf with FWs of images 7 & 8.**	**B4**
14201792	49	soekj	01/12/2016	High adavg (10.93)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
14255055	125	HAMPE	2/23/2017	Left side readings are missing; AD/LD flag	TDS. Participant unable to turn head to the right due neck problems. Pillow under head. Image 7 no NW. Image 8 unreadable.	**May use available data.**	**B1**
14327787	125	CHRIN	11/12/2015	Right side reads are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Deep vessels. Morbidly obese. Images 1-4 unreadable. AD/LD unable to be read.	**Use available Lt side data for analysis.**	**B1**
14429195	125	RASUF	03/08/2016	High mavg_cca (1.39)	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Short neck. Rt FW plaque & Rt NW thickening. Lt NW & FW thickening.	**Use data as is.**	**B1**
14437321	125	JENJE	09/27/2017	Missing: TCSDFl4. Low mavg_cca (0.57725) reads, low mmax_cca (0.64775) reads.	Thin walls NW & FW on Rt & Lt.	**Use data as is.**	**B1**
14440564	125	LEEPE	01/07/2016	High mavg_cca (1.29)	TDS. Rt NW & FW thickening. Rt FW plaque. Lt NW & FW thickening. Images 5 & 6 unreadable.	**Use available data for analysis with caution. Calculated tcaf with images 7 & 8 FWs.**	**B4**

14563705	125	LINAS	1/11/2017	AD/LD flag.	URL will reread for AD/LD	**Use reread data as is.**	**B1**
14563770	49	ULBBR	12/05/2015	Low in mavg_cca (0.568), and mmax_cca (0.682)	Thin walls.	**Use data as is.**	**B1**
14884134	125	PEPRI	10/23/2017	High mavg_cca (1.07188), and high mmax_cca (1.251).	TDS. Unsure where to take the pictures due to special ECG. All images were taken before the P wave, not between the QRS complex.	**Drop observation.**	**B2**
14981278	125	NIETH	10/25/2017	Missing mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, ADAVGr3, ADAVGr4, ADAVGR, tcanr3, tcanr4 . Missing ADAVGr reads.	Images 3 & 4 NW unreadable.	**May use available data for analysis.**	**B1**
15003304	108	JAKJE	09/21/2016	Fw right reads are missing	TDS. Deep vessels. Morbidly obese. Short neck. High bifurcation. Images 1, 2, & 4 unreadable.	**May use tcaf and ADAVG with caution. Calculated tcaf with Image 3 FW from Rt side and images 5 & 6 FWs.**	**B4**
15537294	49	andbj	08/30/2016	High mavg_cca (1.082)	TDS. Deep vessels. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
15550751	125	KESLI	03/19/2017	Low mavg_cca (0.590)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
15652597	125	PEDBY	06/19/2017	Missing mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, tcafr. Missing ADAVGr, ALDr.	TDS. Tortuous vessel. Deep vessels. Images 1-4 unreadable. AD/LD unable to be read.	**May use left side data for analysis.**	**B1**

15698806	10	SONHO	01/26/2015	Missing mavg_cca, mmax_cca, ADAVG.	Images 2, 4-8 were not taken. Participant did not want to continue due to tiredness.	**May use available right side data**	**B1**
15699341	125	JOEMA	08/26/2017	Missing: tcafr2, tcmfr2, tcxfr2,	TDS. Tortuous vessel. Morbidly obese. Image 2 unreadable.	**May use available data for analyses. Use tcaf with caution.**	**B3**
15735294	125	RASVI	10/27/2016	Right side readings are missing	TDS. Deep vessels. Morbidly obese. Rt side images unreadable. Reread for AD/LD.	**Use Lt side data for analysis.**	**B1**
15752769	125	THOOV	08/28/2017	Reader comment: Image 5,6 & 8 cut fw, image 7 unreadable.	TDS. Deep vessels. Morbidly obese. Image 7 unreadable.	**Use available data for analysis. Use ADAVG with caution.**	**B3**
15813059	125	RASHA	10/25/2016	High mavg_cca (1.001)	Rt & Lt FW thickening.	**Use data as is.**	**B1**
15922263	108	LINSV	04/07/2016	Right side reads are missing	TDS. Deep vessels. PPT had a cough. Image 1 only short piece readable. Images 2-4 unreadable. Reread for AD/LD.	**Use Lt side data for analysis.**	**B1**
16031684	108	HANRU	03/11/2015	High in mavg_cca (1.430), mmax_cca (1.736), and adavg (10.37)	RT NW and FW plaque and LT NW and FW thickening would account for higher than average values.	**Use data as is.**	**B1**
16096471	125	IVEWE	10/03/2017	Missing mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, tcanr3, l41ar3, tcanr4, l42ar4, ALDR.	TDS. Deep vessels. Images 3 & 4 NW unreadable. Cannot obtain Rt LD.	**May use available data for analysis. Use ADAVG with caution.**	**B3**
16274417	108	CHRCA	09/07/2015	Missing ADAVGr, ADAVG, ALDR, ALD reads.	Image 3 FW unreadable. Image 4 unreadable. AD/LD unable to obtain.	**May use available data.**	**B1**
16414500	125	ERIJA	06/27/2017	High ADAVG (10.4255) reads.	TDS. Tortuous vessel. Rt NW & FW thickening. Lt NW thickening.	**Use data as is.**	**B1**

16456998	125	CHRKI	09/29/2015	Right side reads are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	TDS. Images 3-4 not provided. PPT had RA & could not move head and only able to lay shortly. AD/LD unable to be read.	**Use available data for analysis.**	**B1**
16501919	125	PAAAL	02/22/2017	Missing reads	Rt side images are unreadable. Lt side images were not provided.	**Drop observation.**	**B2**
16678542	125	NIEOL	02/14/2017	High mavg_cca (1.27)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
16790941	10	NYMHA	05/30/2015	Missing mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, tcafr.	TDS. Tortuous vessel. Morbidly obese. Machine failure. Noise on ECG. Images 1-4 unreadable. Images 5-8 ECG not working so do not know where in the heart cycle the images were captured.	**Drop observation.**	**B2**
16814808	125	NIEIN	02/14/2017	Re-read comments: image3 FW cut, NW unreadable; image5-7 unreadable image. tcafl is missing.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Participant coughed a lot. Very short neck. Image 3 NW unreadable. Images 5, 6 & 7 unreadable.	**May use available data. May use Image 8 FW to calculate tcaf with caution. Use ADAVG with caution.**	**B3**
16846073	49	frali	03/11/2016	Low mavg_cca (0.593)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
16873408	49	niepo	09/15/2015	Right fw reading was missing	URL reread.	**Use reread data as is.**	**B1**
16986408	125	MORNI	2/7/2017	Image 3: NW unreadable. Missing: tchr3.	TDS. Image 3 NW unreadable.	**May use available data for analysis. Use ADAVG with caution.**	**B3**
17122375	125	HANJO	01/21/2016	Missing reads	No images taken on Rt due to pain in neck & shoulder turning left. Images 5-8 unreadable.	**Drop observation.**	**B2**
17309626	49	grumo	08/17/2016	Low mavg_cca (0.589)	Participant has thin walls. Good read.	**Use data as is.**	**B1**

17342288	108	PETKJ	03/15/2016	High adavg (10.58)	TDS. Deep vessels. Morbidly obese. Lt NW thickening.	**Use data as is.**	**B1**
17309626	49	Grumo	08/17/2016	Low mavg_cca (0.58913) reads, low mmax_cca (0.65725) reads.	Thin walls.	**Use data as is.**	**B1**
18248302	125	CLAKA	02/09/2016	Low mavg_cca (0.607)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
18388033	125	JACEL	09/29/2015	Right side readings are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	Images 1-4 not captured. AD/LD unable to be read.	**Use Lt side data only for analysis.**	**B1**
18467142	108	BRUMA	05/30/2017	High mavg_cca (1.01788).	TDS. Participant movement. Participant bearded. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
18906222	125	KRUJA	10/25/2017	Missing mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, mmin_cca, tcanl3, ADAVGl3, tcanl4, ADAVGl4, ADAVG006C.	Images 7 & 8 NW unreadable. URL reread for ADAVG.	**May use available data for analysis. May use ADAVG with caution.**	**B3**
18932962	125	HAVHA	10/12/2015	High adavg (10.11)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
18944397	108	HASKN	10/20/2016	High mavg_cca (1.22)	TDS. Deep vessels. Morbidly obese. Rt & Lt NW thickening. Rt NW plaque.	**Use data as is.**	**B1**
18971101	125	MADLI	12/01/2015	Low mavg_cca (0.575)	Thin walls.	**Use data as is.**	**B1**
19012426	125	SOEET	08/22/2016	High mavg_cca (1.21) Right side reads are missing	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Rt side images cannot be read. They are jugular images not carotid images. Lt NW & FW thickening.	**Use Lt side data for analysis.**	**B1**

19021419	108	MARKR	10/18/2016	Left side reads are missing. Missing ADAVGL, ADAVG, ALDL, ALD reads.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. PPT had pain in neck due to osteoarthritis. Images 3-4 no NW. Images 5-8 unreadable. Cannot obtain AD or LD.	**Use Rt FW data for analysis.**	**B1**
19055608	108	NIEJO	06/30/2015	High in mavg_cca (1.208), mmax_cca (1.415), and adavg (10.450)	Poor RT sided images. NW unreadable/undefined on RT side. Use only FW data on RT side. LT sided images acceptable.	**May use available data. Use ADAVG with caution.**	**B3**
19201482	125	LARLI	12/09/2015	High mavg_cca (1.03)	TDS. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
19406222	49	fugti	10/13/2016	Low mavg_cca (0.586)	Image 3 NW unreadable. Participant has thin walls.	**May use available data. Use ADAVG with caution.**	**B3**
19529058	125	BOEST	11/30/2016	Left side readings are missing. Missing ADAVGl, ADAVG, ALDL, ALD.	TDS. Morbidly obese. Lt side scanning not completed due to machine failure. No further comments on machine failure. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
19861856	125	TAMTO	12/14/2016	Right side readings are missing. Missing ADAVGr, ADAVG, ALDR, ALD.	Rt side images unreadable. AD/LD unable to be read.	**Use Lt side images for analysis.**	**B1**

Pittsburgh (n=72)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
20034542	125	IRERO	07/27/2016	High mavg_cca (1.27)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
30219753	125	SPACH	12/14/2015	High mavg_cca (1.25)	TDS. Very pulsatile vessel. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**

30349229	108	CUNEL	03/05/2015	High mmax_cca value (1.70), mavg_cca (1.21)	Rt & Lt NW & FW thickening. Lt NW plaque.	**Use data as is.**	**B1**
30638084	10	BOLLY	04/05/2016	Missing ADAVGI, ADAVG, ALDL, ALD reads.	Images 7 & 8 unreadable. Reread for AD/LD.	**May use available data. Use ADAVG with caution.**	**B3**
30692968	125	SNYCI	03/23/2017	Low mavg_cca (0.552)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
30769566	125	DONMA	09/01/2015	Low mmax_cca (0.68425 <0.7) reads	TDS. Thin walls.	**Use data as is.**	**B1**
30920898	125	CHAGE	07/11/2017	Reader comment: Image 7&8 not provided. Missing mavg_cca, mmax_cca. Missing ADAVGI, ALDL.	TDS. Deep vessels. Images 7 & 8 were not provided. AD/LD unable to be read.	**May use available data.**	**B1**
30933774	10	ALLJO	05/27/2015	High mavg_cca value (1.25)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
31062623	10	CHIMA	03/23/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Tortuous vessel. Short neck. High bifurcation. Images 5-6 unreadable. No images 7-8. AD/LD unable to be read.	**Use Rt side data for analysis.**	**B1**
31384457	10	STEJO	02/11/2016	High mavg_cca (1.02)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
31559082	125	EVACE	03/15/2017	mavgr_cca, mavg_cca, mmaxr_cca, mmax_cca, mminr_cca, mmin_cca, tcafr.	TDS. Participant movement. Deep vessels. Morbidly obese. Images 1-4 unreadable. Reread for AD/LD.	**May use Lt side data for analysis. Use ADAVG with caution.**	**B3**
31672074	108	SOBEL	08/26/2015	Right side fw reading was missing (tcafr)	Images 1 & 2 Rt FW unreadable.	**Use available data for analysis with caution. Calculated tcaf with FWs of images 3 & 4.**	**B4**
31858897	125	BAUPA	08/15/2017	Reader comment:	TDS. Deep vessels. Morbidly obese. Image 4 NW unreadable.	**May use available data. Use ADAVG with caution.**	**B3**

				Image 4 nw unreadable, cut fw.			
31892466	125	ZONTH	04/18/2017	Low mavg_cca (0.598)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
32017586	49	LIEJO	06/18/2015	Missing in tcafr	Image 8, LT CCA NW/FW, not provided. Images are of acceptable quality.	**May use available data. Use ADAVG with caution.**	**B3**
32113433	125	BRUER	06/08/2016	High mavg_cca (1.15)	TDS. Deep vessels. Morbidly obese. Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
32263402	10	KOSTH	02/12/2015	Missing in mavgl_cca, mmaxl_cca, mminl_cca, and tcafl. Missing ADAVGI, ADAVG, ALDL, ALD.	Left side images were missing due participant refusing to finish scan. Images provided are acceptable. AD/LD unable to be read.	**May use available Rt side data for analysis.**	**B1**
32386013	125	MULLE	10/06/2015	Low mavg_cca (0.59)	Thin walls.	**Use data as is.**	**B1**
32610834	125	KIRDU	11/17/2016	mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, and mmin_cca are missing. Missing ALDL.	Images 7 & 8 NWs unreadable. Cannot obtain LD.	**May use available data. Use ADAVG with caution.**	**B3**
32629974	125	MUTWI	10/07/2015	High mavg_cca (1.29)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
32674368	125	BENAN	2/24/2017	Re-read comments: image7 cut FW, NW unreadable; image8 unreadable. Mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, and mmin_cca are missing. Missing ALDL.	TDS. Tortuous vessel. High bifurcation. Image 5 unreadable. Image 7 NW unreadable. Image 8 unreadable. Cannot obtain LD.	**May use available data. Use ADAVG with caution. Calculated tcaf with Image 7 FW.**	**B4**

33136706	10	33136706	01/14/2015	Missing ADAVGr, ADAVG, ALDR< ALD reads.	Images 1-4 not provided. AD/LD unable to be read.	**Use available Lt side data for analysis.**	**B1**
33399445	10	MICAN	02/24/2015	Missing in mavgr_cca, mmaxr_cca, mminr_cca, and tcafr. Missing ADAVGr, ADAVG, ALDR< ALD.	Right side images were missing. Lt sided images are very poor quality. Image 5 and 6 are unreadable with undefined IMT. AD/LD unable to be read.	**May use available data with caution.**	**B3**
33505365	108	DOUPA	03/09/2015	High mavg_cca value (1.56)	TDS. Tortuous and deep vessels. Rt NW & FW thickening & NW & FW plaque. Lt NW & FW thickening & FW plaque.	**Use data as is.**	**B1**
33738766	108	MCMRI	06/17/2015	High mavg_cca value (1.365)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
33778911	49	curma	03/23/2016	Missing tcafr1 and tcafr2	URL Reread.	**Use URL reread data as is.**	**B1**
33780560	125	MAJLI	12/19/2016	Low mavg_cca (0.573)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
33832965	10	KLAMA	04/30/2015	High mavg_cca value (1.315)	Rt FW thickening & NW plaque. Lt NW plaque.	**Use data as is.**	**B1**
33902289	108	STADA	10/27/2015	High mavg_cca value (1.338)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
34160416	125	BOWMA	12/2/2016	Re-read comments: image7 cut FW, NW unreadable; image8 unreadable. Mavgl_cca, mavg_cca, mmaxl_cca, mmax_cca, mminl_cca, and mmin_cca are missing. Missing ALDL.	TDS. Deep vessels. Morbidly obese. ECG stopped working. Not sure what heart cycle images were captured on. Very thick neck. Scanned in very awkward position. Cannot obtain LD.	**Drop observation.**	**B2**
34186510	125	BAUAN	08/15/2017	Low mavg_cca (0.57563) reads.	Thin walls.	**Use data as is.**	**B1**

34211524	125	HIEWI	03/30/2017	High mavg_cca (1.208)	Rt NW & Lt FW thickening.	**Use data as is.**	**B1**
34212358	108	MILHE	03/03/2015	High mavg_cca (1.330) and mmax_cca (1.570)	Significant bilateral thickening for both NW and FW would account for higher than average values.	**Use data as is.**	**B1**
34265638	108	BILMI	04/08/2015	High mavg_cca value (1.28)	Rt & Lt NW & FW thickening. Lt NW plaque.	**Use data as is.**	**B1**
34392290	125	TELBR	12/05/2016	Low mavg_cca (0.560)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
34560426	108	LOPDI	09/16/2015	Low measures (mavg_cca = 0.577)	Rt & Lt NW & FW thin walls.	**Use data as is.**	**B1**
34620864	108	SCHBE	02/02/2016	High mavg_cca (1.26)	TDS. PPT movement, O2 machine, Rt & Lt NW & FW thickening. Rt NW plaque. Lt FW plaque.	**Use data as is.**	**B1**
34718213	49	BOEHE	07/28/2015	High mavg_cca value (1.296)	Rt NW & FW thickening. Lt NW thickening.	**Use data as is.**	**B1**
35213180	49	STRBE	06/03/2015	High adavg (10.649)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
35223197	49	clyvi	04/18/2016	High mavg_cca (1.20)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
35305722	108	MARJE	08/11/2015	Left side NW reading was missing (tcafl). Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Tortuous vessel. Painful to touch (Fibromyalgia). Couldn't push hard on probe. Images 5 & 6 missing. Image 7 NW unreadable. Reread for AD/LD.	**May use available data for analysis. Use ADAVG with caution.**	**B3**
35347871	108	JAMTO	03/28/2016	Low mavg_cca (0.53)	Thin walls. ECG not working.	**Drop observation.**	**B2**
35636232	125	SPAJO	06/02/2016	Missing ADAVGr, ADAVGI, ADAVG, ALDR, ALDL, ALD reads.	Images 1-4 and 6-8 missing. AD/LD unable to be read.	**May use available data with caution.**	**B3**
35654870	125	MCCAM	08/01/2016	Low mavg_cca (0.59)	Thin walls.	**Use data as is.**	**B1**

35659755	108	MILRO	03/03/2015	High mavg_cca (1.324) and mmax_cca (1.505)	Significant bilateral thickening for both NW and FW would account for higher than average values.	**Use data as is.**	**B1**
35737964	125	HUBJO	07/26/2017	Reader comment: Image 3&4 nw unreadable, cut fw; image 5~8 not provided. Missing all left side data and the near wall for right side, mavg_cca, mmax_cca.	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Large neck. Images 3 & 4 NWs unreadable. Images 5-8 not provided.	**May use available data with caution.**	**B3**
35784974	108	MCCMI	07/20/2015	Low measures (mavg_cca = 0.586)	Rt & Lt NW & FW thin walls.	**Use data as is.**	**B1**
35989904	108	BALTH	05/15/2015	High mavg_cca value (1.32)	Rt & Lt NW & FW thickening. Lt NW plaque.	**Use data as is.**	**B1**
36055855	49	reima	03/05/2016	Low mmax_cca (0.68)	Thin walls.	**Use data as is.**	**B1**
36072643	125	STODO	09/29/2015	Low mavg_cca (0.52)	TDS. Very high bifurcation. Thin walls.	**Use data as is.**	**B1**
36250371	125	DONJA	10/20/2016	Low mavg_cca (0.58)	Thin walls.	**Use data as is.**	**B1**
36462224	49	lamga	04/12/2016	High mavg_cca (1.14) Left side reads are missing	TDS. Deep vessels. Morbidly obese. Rt NW & FW thickening. Lt FW thickening.	**Use data as is.**	**B1**
36538826	49	etzpa	03/31/2016	Low mavg_cca (0.56)	Thin walls.	**Use data as is.**	**B1**
36670685	125	STOLA	05/23/2017	Low mavg_cca (0.58575)	Thin walls.	**Use data as is.**	**B1**
36671675	125	MILCA	06/21/2016	Low mmax_cca (0.69)	Thin walls.	**Use data as is.**	**B1**

36941938	49	kraje	03/01/2016	Left side reads are missing. Missing ADAVGI, ADAVG, ALDL, ALD.	TDS. Very high bifurcation. Thick neck. Rt NW thickening. Lt FW thickening. No images 7-8. AD/LD unable to be read.	**Use available data for analysis.**	**B1**
37062916	49	walro	09/29/2015	High mavg_cca value (1.317); left side readings were missing. Missing ADAVGI, ADAVG, ALDL, ALD.	Rt NW & FW thickening & FW plaque. Lt Images 7 & 8 unreadable. AD/LD unable to be read.	**Use available data for analysis.**	**B1**
37527018	125	MARRI	02/20/2017	Low mavg_cca (0.524)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
37680105	108	SHOMA	05/13/2015	High mavg_cca value (1.24)	Rt NW plaque. Lt TDS. Turtuous vessel. Lt NW & FW thickening.	**Use data as is.**	**B1**
37688801	125	REAWI	06/21/2016	Missing reads	TDS. Tortuous vessel. Deep vessels. Morbidly obese. Very large thick short neck due to PPT habitus. No images obtained.	**Drop observation.**	**B2**
38257812	125	GAPCY	03/28/2017	Low mavg_cca (0.573)	Participant has thin walls. Good read.	**Use data as is.**	**B1**
38394326	125	SZAJA	07/12/2016	High adavg (10.15)	Lt NW & FW thickening.	**Use data as is.**	**B1**
38445186	125	ADADI	12/12/2016	Low mavg_cca (0.564)	TDS. Tortuous vessel. Participant has thin walls. Good read.	**Use data as is.**	**B1**
38561555	108	FREJU	07/27/2015	High mavg_cca value (1.074)	Rt & Lt NW & FW thickening.	**Use data as is.**	**B1**
38566478	108	LANED	07/13/2015	High mavg_cca value (1.441)	Rt & Lt NW & FW thickening. Lt FW plaque.	**Use data as is.**	**B1**
38665651	125	FIOMO	09/02/2015	High mmax_cca value (1.640)	Rt & Lt NW thickening. Rt NW plaque.	**Use data as is.**	**B1**

39310677	125	BODRE	02/21/2017	Re-read comment: image7 FW unreadable. Tcafl is missing.	TDS. Participant movement. Deep vessels. URL re-read.	**Use reread data as is.**	**B1**
39436563	49	douje	04/18/2016	Left side reads are missing	TDS. Very high bifurcation. Thick neck. No images 7-8.	**Use available data for analysis.**	**B1**
39466990	125	ROHDA	09/23/2015	High mavg_cca (1.23)	Lt & Rt NW & FW thickening.	**Use data as is.**	**B1**
39589024	125	OHALA	10/13/2016	Low mavg_cca (0.57)	Thin walls.	**Use data as is.**	**B1**
39615712	10	MCGRO	03/04/2015	High adavg (10.096)	Images are of good quality. Calibration checked.	**Use data as is.**	**B1**
39741467	125	RILKA	02/09/2016	Low mavg_cca (0.54)	Thin walls.	**Use data as is.**	**B1**

APPENDIX IV: LLFS PLAQUE FLAGS

Date this file last updated: 07/13/2018
Developed by: University of Pittsburgh Ultrasound Research Lab (LLFS Ultrasound Reading Center)
Date of scan (DOS) dates: 10/12/2014-11/30/2017
Read dates (DOR): 11/06/2014-12/11/2017
LLFS Plaque Raw Data: Total N=2675
LLFS Plaque Frozen Data for Analysis: Total N=2669

Data Check Codes

This appendix includes data from the **finalcqi.sas7bdat** dataset that were flagged by the URL for checking.

The following codes were created for plaque data checked to describe how individual observations were handled for the data to be used for analyses. A more detailed description explaining the determination of these codes is included below in the data check table **(n=94)**.

B1 – Use data as is (n=22)
(BU-0; CU-7; DEN-3; PGH-2)
B2 – Drop Observation (n=6)
(BU-1; CU-3; DEN-1; PGH-1)
B3 – Modification or caution recommended: refer to data check table for specifics (n=66);
(BU-22; CU-13; DEN-18; PGH-13)

Sixty six observations were flagged to use available plaque data with caution as they had missing segment data. Furthermore, plaque data were imputed in a new variable (PI_min) based on the minimum value of plaque seen by side and overall plaque index.

Denmark (n=38)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
10041309	049	JOHMA	11/10/2014	Missing graerq, graelq.	ECA not seen on RT or LT Set PIR, PIL and PI to missing and set PIR_min=4, PIL_min=5, and PI_min=9.	**Use the imputed data with caution.**	**B3**
10283159	125	Soepe	06/20/2017	Missing graelq.	ECA not seen on LT Set PIL and PI to missing and set PIL_min=2 and PI_min=4.	**Use the imputed data with caution.**	**B3**
10987071	049	JENNI	12/09/2014	Missing graerq.	RT ECA not seen Set PIR and PI to missing and set PIR_min=2 and PI_min=4.	**Use the imputed data with caution.**	**B3**
11409794	049	NIEKN	03/03/2015	Missing grailq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=5.	**Use the imputed data with caution.**	**B3**
11495844	049	PEDMA	01/14/2015	Missing gra1rq, graerq.	RT Proximal CCA not seen RT ECA not seen Set PIR and PI to missing, and set PIR_min=2 and PI_min=3.	**Use the imputed data with caution.**	**B3**
11556868	125	Rasja	10/02/2017	Missing graelq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=1.	**Use the imputed data with caution.**	**B3**

12405420	049	MATNI	10/12/2015	Missing grailq, graelq.	LT ICA and ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=3.	**Use the imputed data with caution.**	**B3**
12906061	049	HANEL	11/25/2014	Missing graerq, graelq.	RT ECA not seen LT ECA not seen Set PIR, PIL and PI to missing, and set PIR_min=2 PIL_min=2, and PI_min=4.	**Use the imputed data with caution.**	**B3**
14255055	125	HAMPE	02/23/2017	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=1.	**Use the imputed data with caution.**	**B3**
14455647	125	Harin	06/26/2017	Missing grailq, graelq.	LT ICA not seen LT ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=2.	**Use the imputed data with caution.**	**B3**
15144264	108	JOHEJ	06/10/2015	Missing PIL, PI, all left side plaque data.	No LT side scout clips provided (tech accidently deleted)	**Use data as is.**	**B1**
15322829	125	JENPO	04/05/2017	Missing grairq, graerq.	RT ICA not seen RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=4.	**Use the imputed data with caution.**	**B3**
15698806	049	SONHO	01/26/2015	Missing PIL, PI, all left side plaque data.	Participant requested test stopped after 2 images on the RT were acquired	**Use the imputed data with caution.**	**B3**

					Set PIL and PI to missing, and set PI_min=6		
15972251	125	Frepe	06/14/2017	Missing grailq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=5 and PI_min=11.	**Use the imputed data with caution.**	**B3**
16144751	049	HANSV	03/11/2015	Missing gra1rq, gra2rq, grairq, graerq, grailq, graelq.	Poor scan on RT, could not assess plq. LT ICA not seen LT ECA not seen	**Use data as is.**	**B1**
16414500	125	Erija	06/27/2017	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=2 and PI_min=2.	**Use the imputed data with caution.**	**B3**
16500978	049	RASET	11/17/2014	Missing grailq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=2.	**Use the imputed data with caution.**	**B3**
16932329	125	MORKI	02/07/2017	Missing grairq.	RT ICA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=2.	**Use the imputed data with caution.**	**B3**
17122375	125	HANJO	01/21/2016	Missing PIR, PI, right side plaque data.	RT side scans and images not provided due to pain in participant's neck (could not turn head to left)	**Drop observation.**	**B2**
17135386	049	ERIGE	03/03/2015	Missing graerq.	Added to RedCAP 6-7-18 RT ECA 0 plqs 0 grade	**Use data as is.**	**B1**

19304956	049	JENMA	11/17/2014	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=3.	**Use the imputed data with caution.**	**B3**
19754225	049	DALMA	04/16/2015	Missing grairq.	RT ICA not seen Set PIR and PI to missing, and set PIR_min=6 and PI_min=10.	**Use the imputed data with caution.**	**B3**

Boston (n=45)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
21400379	082	21400379	11/11/2014	Missing grairq, graerq.	RT ICA not seen RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=5.	**Use the imputed data with caution.**	B3
22074397	082	22074397	01/06/2015	Missing gra1rq, gra2rq, graerq, graelq.	RT Prox CCA not seen RT Dist CCA not seen RT ECA not seen LT ECA not seen Set PIR, PIL and PI to missing, and set PIR_min=4, PIL_min=2 and PI_min=6.	**Use the imputed data with caution.**	B3
22696215	108	22696215	08/12/2015	Missing grairq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=3.	**Use the imputed data with caution.**	B3

23479750	082	23479750	02/01/2015	Missing gra3lq, grailq, graelq.	LT Bult, ICA & ECA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=2.	**Use the imputed data with caution.**	B3
23712136	125	23712136	08/26/2017	Missing grailq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=3.	**Use the imputed data with caution.**	B3
24226417	125	24226417	06/25/2017	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=4.	**Use the imputed data with caution.**	B3
24958853	082	24958853	10/29/2014	Missing gra1lq, gra2lq, grailq, graelq.	Very poor scan LT Prox CCA, Dist CCA, ICA & ECA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=9.	**Use the imputed data with caution.**	B3
26538679	049	26538679	05/13/2015	Missing PIL, PI, all left side plaque data.	Refused LT side scan Set PI to missing, and set PI_min=3.	**Use the imputed data with caution.**	B3
26725979	108	26725979	07/29/2015	Missing grailq.	LT ICA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=6.	**Use the imputed data with caution.**	B3
26732396	082	26732396	01/30/2015	Missing gra1lq, gra2lq, gra3lq, graelq.	Very poor scan LT Prox CCA, Dis CCA, Bulb & ECA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=4.	**Use the imputed data with caution.**	B3

26972190	082	26972190	11/24/2014	Missing grairq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=2 and PI_min=5.	**Use the imputed data with caution.**	B3
27423350	082	27423350	12/10/2014	Missing grairq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=6.	**Use the imputed data with caution.**	B3
28059856	082	28059856	03/16/2015	Missing PIL, PI, all left side plaque data.	Participant refused LT side scan	**Drop observation.**	B2
28088375	082	28088375	12/08/2104	Missing gra1lq, gra2lq, grailq.	LT Prox CCA, Dis CCA & ICA not seen Set PIL and PI to missing, and set PIL_min=3 and PI_min=7.	**Use the imputed data with caution.**	B3
28228724	125	28228724	12/02/2015	Missing gra1lq.	LT Prox CCA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=2.	**Use the imputed data with caution.**	B3
28359131	082	28359131	02/04/2015	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=5 and PI_min=8.	**Use the imputed data with caution.**	B3
29047263	082	29047263	11/25/2014	Missing graerq.	RT EcA not seen Set PIR and PI to missing, and set PIR_min=4 and PI_min=4.	**Use the imputed data with caution.**	B3
29437829	082	29437829	03/06/2015	Missing gra1rq.	RT Prox CCA not seen Set PIR and PI to missing, and set PIR_min=4 and PI_min=7.	**Use the imputed data with caution.**	B3

29481108	082	29481108	02/02/2015	Missing grairq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=2 and PI_min=2.	**Use the imputed data with caution.**	B3
32174021	082	32174021	11/22/2014	Missing grairq, graerq.	RT ICA & ECa not seen Set PIR and PI to missing, and set PIR_min=2 and PI_min=2.	**Use the imputed data with caution.**	B3
34968693	125	34968693	05/11/2017	Missing graelq.	LT ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=1.	**Use the imputed data with caution.**	B3
39547782	125	39547782	06/25/2017	Missing gra1lq.	LT PRox CCA not seen Set PIL and PI to missing, and set PIL_min=4 and PI_min=10.	**Use the imputed data with caution.**	B3
45828282	082	45828282	12/10/2014	Missing graelq.	LT ECA not seen Set PIL and PI to missing, and set PIL_min=5 and PI_min=5.	**Use the imputed data with caution.**	B3

Pittsburgh (n=22)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
21225111	108	MARMA	09/08/2015	Missing gra1rq.	RT Prox CCA not seen Set PIR and PI to missing, and set PIR_min=7 and PI_min=16.	**Use the imputed data with caution.**	B3

30057798	108	KOVET	08/06/2015	Missing graelq.	Added in RedCAP 6/7/18 RT ECA 0 plqs 0 grade	Use data as is.	B1
30710495	085	HEPOS	11/21/2014	Missing PIL, PI, all left side plaque data.	Participant had endarterectomy Set PI to missing, and set PI_min=10.	**Use the imputed data with caution.**	B3
31809411	085	JARHA	11/20/2014	Missing graelq.	LT ECa not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=1.	**Use the imputed data with caution.**	B3
32009657	085	GOOMA	03/04/2015	Missing PIL, PI, all left side plaque data.	Clips messed up, cannot assess plq Set PI to missing, and set PI_min=3.	**Use the imputed data with caution.**	B3
32755953	108	SCHCH	04/16/2015	Missing rgailq, graelq.	LT ICE & ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=5.	**Use the imputed data with caution.**	B3
33399445	085	MICAN	02/24/2015	Missing all plaque data.	Very poor scans, plq could not be assessed	Drop observation.	B2
34357996	108	BOLLE	04/01/2015	Missing gra1rq, grairq, graerq.	RT Prox CCA , ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=3.	**Use the imputed data with caution.**	B3
33505365	108	DOUPA	03/09/2015	Missing PIL, PI, all left side plaque data.	Very poor scout scans on LT, plq could not be assessed Set PI to missing, and set PI_min=5.	**Use the imputed data with caution.**	B3
34184481	085	JARCA	11/20/2014	Missing graelq.	LT ECA not seen	**Use the imputed data with caution.**	B3

					Set PIL and PI to missing, and set PIL_min=2 and PI_min=5.		
35558668	108	REIBE	09/10/2015	Missing PIL, PI, gra1rq, all left side plaque data.	RT Prox not seen LT Scout scans not provided Set PIR and PI to missing, and set PIR_min=3 and PI_min=3.	**Use the imputed data with caution.**	B3
35737964	125	Hubjo	07/26/2017	Missing PIL, PI, all left side plaque data.	No LT Images or scans provided	**Use data as is.**	B1
38227831	108	MINMA	04/22/2015	Missing graelq.	LT ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=6.	**Use the imputed data with caution.**	B3
39227285	085	DONAN	11/12/2014	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=3 and PI_min=8.	**Use the imputed data with caution.**	B3
39405783	108	GONER	04/01/2015	Missing graerq.	RT ECa not seen Set PIR and PI to missing, and set PIR_min=4 and PI_min=7.	**Use the imputed data with caution.**	B3
39969738	085	KIRAR	05/05/2015	Missing PIR, PI, all right side plaque data.	Clips corrupted Set PI to missing, and set PI_min=2.	**Use the imputed data with caution.**	B3

Columbia (n=36)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback	Recommendations	Data Codes*
38522794	108	DORWI	05/21/2015	Missing grailq, rgaelq.	LT ICA & ECA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=5.	**Use the imputed data with caution.**	B3
40487518	085	KAHIR	10/30/2014	Missing PIR, PI, all right side plaque data.	Very poor RT scout scans, plq cannot be assessed Set PI to missing, and set PI_min=2.	**Use the imputed data with caution.**	B3
40705783	108	CONJO	04/30/2015	Missing PIL, PI, all left side plaque data.	LT side not done, not enough time	**Use data as is.**	B1
40952012	108	KALDE	05/01/2015	Missing PIR, PI, all right side plaque data.	Very poor- cannot assess plq Set PI to missing, and set PI_min=1.	**Use the imputed data with caution.**	B3
41693685	125	PELAN	01/26/2016	Missing PIL, PI, all left side plaque data.	Lt side not done	**Use data as is.**	B1
41769779	049	SHETH	12/01/2014	Missing graerq.	RT ECA not seen	**Use data as is.**	B1
41855744	049	BRARI	03/26/2015	Missing PIR, PI, gra3lq, grailq, graelq, all right side plaque data.	Very poor LT scans- cannot assess plq RT Bulb, ICA, & ECA not seen LT Bulb, ICA & ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=1.	**Use the imputed data with caution.**	B3

41860727	049	SCHGL	03/17/2015	Missing PIL, PI, all left side plaque data.	Corrected in RedCAP 6-7-18 NO plq on the LT side	Use data as is.	B1
42224477	049	COHHA	12/13/2014	Missing all plaque data.	Lost LT images by site, poor scout scans	Drop observation.	B2
42991307	049	FOWWA	03/04/2015	Missing graelq.	LT ECA not seen Set PIL and PI to missing, and set PIL_min=2 and PI_min=4.	**Use the imputed data with caution.**	B3
43065771	108	SPILE	05/20/2015	Missing gra2lq.	Added on RedCAP 6-7-18 LT Dis CCA 0 plqs 0 grade	Use data as is.	B1
43373695	125	KAPNA	04/27/2016	Missing PIL, PI, all left side plaque data.	Lt side not scanned	**Use data as is.**	B1
44192573	049	BRAIS	03/25/2015	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=3.	**Use the imputed data with caution.**	B3
45712882	049	KELNI	12/09/2014	Missing grairq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=5 and PI_min=14.	**Use the imputed data with caution.**	B3
45829785	049	ZAPMI	11/19/2014	Missing greilq, graelq.	LT ICA & ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=2.	**Use the imputed data with caution.**	B3
45832730	108	CARAR	04/28/2015	Missing PIL, PI, all left side plaque data.	LT side not scanned Set PI to missing, and set PI_min=3.	**Use the imputed data with caution.**	B3
46479101	049	ROTST	06/18/2015	Missing graerq.	RT ECA not seen	**Use the imputed data with caution.**	B3

					Set PIR and PI to missing, and set PIR_min=2 and PI_min=11.		
46811456	049	PRAMO	01/21/2015	Missing PIR, PI, all right side plaque data.	Added on RedCAP 6-7-18 No plaque on RT side	Use data as is.	B1
46956215	049	STEES	03/19/2015	Missing graelq.	LT ECA not seen Set PIL and PI to missing, and set PIL_min=1 and PI_min=2.	**Use the imputed data with caution.**	B3
47885258	125	BRAAR	09/14/2016	Missing grqirq, graerq.	RT ICA & ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=1.	**Use the imputed data with caution.**	B3
48247779	085	COHPA	10/29/2014	Missing all plaque data.	Very poor scans, cannot asses for plq	Drop observation.	B2
48953087	049	ROSDA	03/07/2015	Missing all plaque data.	Very poor scans, cannot assess for plq	Drop observation.	B2
49553085	049	SKRED	12/19/2014	Missing graerq.	RT ECA not seen Set PIR and PI to missing, and set PIR_min=1 and PI_min=2.	**Use the imputed data with caution.**	B3

APPENDIX V: LLFS MISSING DATA

This appendix includes participants who completed a carotid exam but had carotid IMT and plaque data missing for the following reasons: (n=41)

Equipment problems: (n=2)
Participant unable to do exam: (n=5)
Participant refused exam: (n=10)
Not enough time: (4)
Corrupt USB: (n=10)
Other: (n=10)

ID	Reader	INITS	DOS	Missing Image/Problem	Lab Feedback
11086980	049	MOEIN	11DEC2014	Missing all IMT and plaque data	Participant refused scan
11146263	049	SAS	18NOV2014	Missing all IMT and plaque data	Participant refused scan
11503150	049	LARES	12OCT2014	Missing all IMT and plaque data	Participant refused scan
11563294	049	POUKA	18NOV2014	Missing all IMT and plaque data	Participant refused scan
11600301	049	MADEL	04MAR2015	Missing all IMT and plaque data	Participant refused scan
11795698	049	FRAAAS	07MAY2015	Missing all IMT and plaque data	Participant refused scan
13948138	049	HANME	16FEB2015	Missing all IMT and plaque data	'Too painful to lie down', scan not done
14584222	049	MDEAN	04DEC2014	Missing all IMT and plaque data	Participant refused scan
14686828	049	SOEBO	12NOV2014	Missing all IMT and plaque data	Scan terminated after right side scouts
16509425	049	LIVKA	15APR2015	Missing all IMT and plaque data	No scan – unable to lay flat
21893409	125	21893409	04MAR2016	Missing all IMT and plaque data	Corrupt USB
24538846	082	24538846	16FEB2015	Missing all IMT and plaque data	Participant refused scan
25183195	082	25183195	30APR2015	Missing all IMT and plaque data	Data accidently deleted by site

27233551	125	27233551	05MAR2016	Missing all IMT and plaque data	Corrupt USB
27281773	125	27281773	05MAR2016	Missing all IMT and plaque data	Corrupt USB
27723444	082	27723444	30APR2015	Missing all IMT and plaque data	Scan accidently deleted by site
28951299	082	28951299	02JAN2015	Missing all IMT and plaque data	Scan not done, not enough time
29618410	125	29618410	05MAR2016	Missing all IMT and plaque data	Corrupt USB
29691292	082	29691292	18FEB2015	Missing all IMT and plaque data	Scan not done, participant unable to lie flat
29773296	082	29773296	30JAN2015	Missing all IMT and plaque data	Participant refused scan
33136706	085	SMILO	01/14/2015	Missing all plaque data	USB malfunction – no clips provided
34464602	125	BARMA	26FEB2015	Missing all IMT and plaque data	Lost data
35414069	125	35414069	04MAR2016	Missing all IMT and plaque data	Corrupt USB
35558668	108	REIBE	10SEP2015	Missing all IMT data	No scan – only clips provided
37234028	049	ROTIR	03DEC2014	Missing all IMT and plaque data	No scan – insufficient time
37688801	108	REAWI	21JUN2016	Missing all IMT data	No images – only clips
39313770	125	39313770	05MAR2016	Missing all IMT and plaque data	Corrupt USB
39321492	082	39321492	04MAR2016	Missing all IMT and plaque data	Corrupt USB
40589146	049	HARMA	02DEC2014	Missing all IMT and plaque data	Participant refused scan
40595730	108	WELHE	05MAY2015	Missing all IMT and plaque data	Corrupted
40684706	049	GREEV	01MAR2015	Missing all IMT and plaque data	No scan, unable to lie flat
41280942	049	ROSMA	02MAR2015	Missing all IMT and plaque data	No scan, insufficient time
42691360	049	HOLDA	04DEC2014	Missing all IMT and plaque data	No scan, no adequate scanning area
42963554	108	SACRO	16JUL2015	Missing all IMT and plaque data	Corrupted after data streaming
43131911	049	DIMJO	21NOV2014	Missing all IMT and plaque data	No scan, machine failure
43303775	049	GALED	16DEC2014	Missing all plaque data	No scout scans, just images
45984846	049	BORIR	02MAR2015	Missing all IMT and plaque data	No scan, insufficient time

46318127	049	HOLED	04DEC2014	Missing all IMT and plaque data	No scan, no adequate scan area
46744059	082	46744059	04MAR2016	Missing all IMT and plaque data	Corrupt USB
46828901	125	ELKST	27APR2016	Missing all IMT data	Only clips provided
47090022	049	WESJE	10FEB2016	Missing all IMT data	Images lost – machine failure